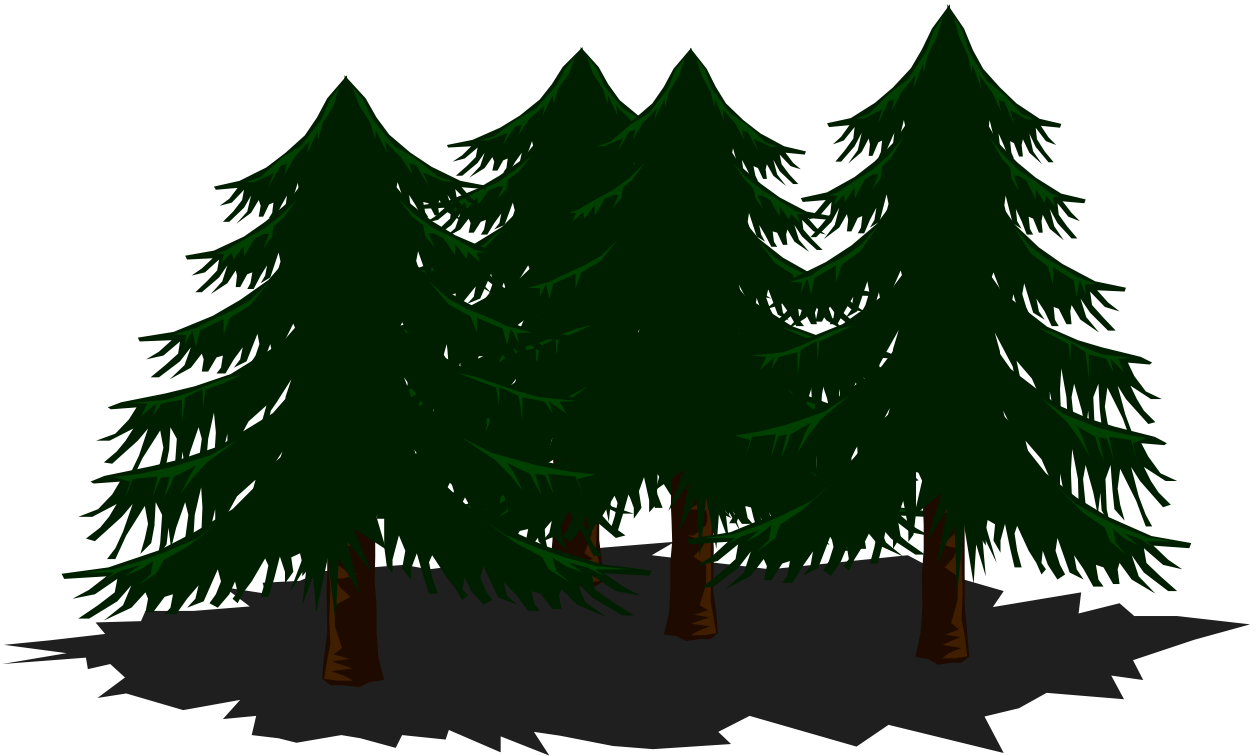


**Factors Affecting Forestland Conversion and the Feasibility  
of Cooperative Land Management Efforts at King County's  
Urban/Rural Interface**



Benj Wadsworth  
University of Washington  
College of Forest Resources  
December, 1999

**Factors Affecting Forestland Conversion and the Feasibility of Cooperative  
Land Management Efforts at King County's Urban/Rural Interface**

Benjamin Wadsworth

A thesis submitted in partial fulfillment of the  
requirements for the degree of

Master of Science

University of Washington  
1999

Program Authorized to Offer Degree: College of Forest Resources

In presenting this thesis in partial fulfillment of the requirements for a Master's degree at the University of Washington, I agree that the Library shall make its copies freely available for inspection. I further agree that extensive copying of this thesis is allowable only for scholarly purposes, consistent with "fair use" as prescribed in the U.S. Copyright Law. Any other reproduction for any purposes or by any means shall not be allowed without my written permission.

Signature \_\_\_\_\_

Date \_\_\_\_\_

## Abstract

### Factors Affecting Forestland Conversion and the Feasibility of Cooperative Land Management Efforts at King County's Urban/Rural Interface

Benjamin Wadsworth

Chairman of the Supervisory Committee:  
Dr. Gordon A. Bradley  
College of Forest Resources

King County, Washington is experiencing a rapid conversion of forestland to urban development along the urban/rural interface. This study surveyed forest landowners at the interface to understand what characteristics, values and objectives are affecting landowner decisions to sell or subdivide land. The study evaluates the feasibility of cooperative land management efforts as a way of reducing the conversion of forestland.

Many of these landowners are "new" owners who have bought their land in the last twenty years. The vast majority owns less than 40 acres, and roughly half live on their land. They are a well-educated group with an average annual household income of \$60,000. Most of these owners are not interested in timber production, and, although the investment value of their land is important to them, the majority are not overly eager to profit through the sale or subdivision of the land. Financial reasons and reasons relating to the quality of the surrounding area are equally important factors in their decisions regarding future sale or subdivision of their land.

Cooperative forestland management efforts are likely to be a challenge with this group of owners. The majority expressed little interest in cooperating for any reason, although there is more interest in cooperating to preserve the forest than to manage it for timber, recreation, or wildlife.

## TABLE OF CONTENTS

List of Figures	iii
List of Tables	iv
Chapter 1: Introduction	1
Research Questions	2
Thesis Outline	4
Chapter 2: The Urban\Rural Interface	5
Factors Causing the Conversion of Forestland at the Interface	5
The Problems of the Interface	6
Chapter 3: The Study Area - King County, Washington	9
Chapter 4: Cooperative Land Management Efforts	13
Benefits of Cooperative Land Management	13
History of Cooperative Land Management Efforts	14
Factors that Facilitate Cooperative Land Management	15
Potential Barriers to Cooperative Land Management	16
Chapter 5: Methodology	18
Population and Sampling Procedure	18
The Survey	22
Data Analysis	24
Attitude/Behavior research	25
Chapter 6: Results	27
The Response Rate	27
Forest Landowners at the Urban/Rural Interface	27
Forestland ownership patterns	27
Values and objectives	29
Intentions	33
Involvement in cooperative efforts	39
Demographic characteristics	40
Traditional owners and “new” owners	41

Factors that Relate to Landowner Decision-making	42
Selling or subdividing forestland for financial reasons	42
Selling or subdividing forestland for reasons related to the quality of the surrounding area	43
Cooperating to preserve forestland	44
Cooperating to manage forestland	45
Chapter 7: Discussion	47
The Population at the Urban/Rural Interface	47
Likelihood of selling or subdividing forestland	48
Factors impacting owner decisions to sell or subdivide	49
Likelihood of cooperating	50
Factors impacting owner decisions to enter into cooperative efforts	52
Chapter 8: Policy Recommendations	54
Chapter 9: Conclusion	57
Directions for Future Research	57
List of References	59
Appendices	64

## **LIST OF FIGURES**

Figure 1: King County Comprehensive Plan zoning designations	10
Figure 2: Location of properties sampled for study	19
Figure 3: Vashon Island Forest District	21

## LIST OF TABLES

Table 1: Explanatory factors included in study	3
Table 2: Parcel size (acres) and ownership in the Rural Forest District, King County, Washington, 1996.	18
Table 3: Parcel size (acres) and ownership in Vashon Forest District, King County, Washington, 1999	20
Table 4: Parcel size (acres) and ownership for parcels in the Forest Production District from 4 to 100 acres in size and within one mile of the Rural Area boundary, King County, Washington, 1996.	20
Table 5: Parcel size breakdown of total population and sample	22
Table 6: Distribution of owners by amount of land owned	28
Table 7: Number of years owner has owned land	28
Table 8: Types of settings in which respondents currently live	28
Table 9: Enrollment in King County tax programs	29
Table 10: Landowner Ratings of Possible Management Objectives	30
Table 11: Reasons for Owning Forestland: Rotated Factor Matrix	31
Table 12: $\alpha$ s, means and standard deviations for each of the factors derived from the factor analyses of management objectives	31
Table 13: Scale measuring attitudes toward the role of forestland as part of the larger landscape	32
Table 14: Factor analysis of attitude toward the role of forestland as part of the larger landscape	33
Table 15: Respondents' intended plans for forestland	33
Table 16: Likelihood of respondents selling or subdividing their forestland in the next five years if any of the following situations were to take place	34
Table 17: Reasons for selling or subdividing: Rotated Factor Matrix	35
Table 18: $\alpha$ s, means and standard deviations for each of the factors derived from the factor analysis of reasons for selling or subdividing forestland	36
Table 19: Likelihood of respondents entering a cooperative effort	37
Table 20: Reasons for cooperating: Rotated Factor Matrix	38
Table 21: $\alpha$ s, means and standard deviations for each of the factors derived from the factor analysis of reasons for entering cooperative efforts	39
Table 22: Interest in various forms of leadership for cooperative efforts	39
Table 23: Respondents' age distribution by 10 yr. classes	40
Table 24: Respondents' education level distribution	40
Table 25: Respondents' annual household income	40
Table 26: Percentage of total assets invested in forestland	41
Table 27: Explanatory variables related to the likelihood of a landowner selling or subdividing forestland for financial reasons	43

Table 28: Explanatory variables related to the likelihood of a landowner selling or subdividing forestland for reasons related to the quality of the surrounding area	44
Table 29: Explanatory variables related to the likelihood of a landowner cooperating to preserve forestland	45
Table 30: Explanatory variables related to the likelihood of a landowner cooperating to manage forestland	46

## CHAPTER 1: INTRODUCTION

Over the past decade, King County, Washington has been one of the fastest growing counties in the United States. People from around the country have been drawn to the area by a strong economy and the natural amenities of the region. However, this growth is threatening the qualities that attract so many people in the first place. As metropolitan Seattle sprawls outward in all directions, the value of land for residential development is increasing dramatically in relation to its value as productive forestland. Forest landowners are confronted with a rural environment that is becoming more urban and presented with a tremendous financial opportunity. Many landowners are choosing to sell or subdivide their land. The loss of the forest land base and the rural way of life which have characterized King County for the past century are very real concerns for county planners and natural resource managers, as well as rural landowners.

While the issue of forest conversion at the urban/forest interface is particularly acute in King County, it is by no means unique to this area. Interface lands across the country are feeling the pressure of urbanization, and the issue has recently received a great deal of attention in the field of natural resource management. Forestland conversion is resulting in a number of ecological and social problems, and planners and resource managers are coming to realize that these problems can no longer be ignored.

At the mandate of the state's Growth Management Act, King County and other urbanizing counties in Washington are beginning to address the issue through various planning programs. Urban growth boundaries, zoning regulations, financial incentives and technical assistance programs have slowed the conversion, but they have not solved the problem. One effort that has not been tried with any frequency is the formation of cooperative efforts whereby landowners agree to work together to manage their forestlands across property boundaries for both environmental and economic reasons.

Cooperative forest management has received a good deal of attention recently, primarily because the concept of ecosystem management has been widely accepted as the future approach to forest management. Ecosystem management and the related field of landscape ecology require land managers to look at a variety of spatial scales when making management decisions. As Campbell (1996) suggested, ecosystem management "requires sensitivity to a larger landscape scale and to whether practices on a given property will have ripple effects on ecological processes beyond those boundaries." Sample (1992) addressed the issue of cumulative impacts in suggesting that "a more enlightened approach to the management of one parcel of land would be of little consequence if there were no consideration of what was taking place simultaneously on other parcels within the same ecologically-defined boundaries."

While forest ecosystem management has focused mostly on large landscapes where the impacts of human activity result from timber harvest rather than residential development, this emphasis does not preclude the application of the concept to smaller forest landscapes at the urban/rural interface. As Campbell (1996) suggests, "Ecosystem management can take place at many scales - from a 10-acre meadow to a four-state watershed." A great deal of research has focused on the ecological aspects of landscape

management, but relatively little has addressed the social feasibility of managing across boundaries on private lands.

## **Research Questions**

This study addresses the issue of forestland conversion at the urban/rural interface in King County by (1) examining the land management values and objectives of the forest landowners who live there and (2) exploring the feasibility of cooperative planning efforts as a way of reducing conversion. The study evaluates how these land management values and objectives, along with various ownership patterns and demographic traits, are affecting the conversion of forestland to urban development and the willingness of landowners to enter cooperative efforts. Clearly, these two objectives are linked. As discussed in Chapter 4, the success of cooperative efforts depends in large part on the participants having similar ownership values and objectives, or at least understanding the objectives of the others involved in the effort.

This study is driven by the following research questions:

1. What are the predominant land management values and objectives of forest landowners at the urban/rural interface of King County? Do these ownership values and objectives, along with specific demographic traits or land ownership patterns, significantly impact a landowner's decision to sell or subdivide her/his land?
2. How do landowners at the urban/rural interface view the concept of cooperative management? Do ownership values or objectives, specific demographic traits, land ownership patterns, or past involvement in cooperative efforts significantly impact whether or not a landowner is likely to enter into a cooperative agreement in the management of her/his forestland?

In addition to questions 1 and 2, the study addressed the following questions in an effort to provide policy recommendations to King County as it explores the feasibility of promoting cooperative efforts among landowners:

3. Does the existence of a government agency as the lead in a cooperative effort have a negative impact on the potential for success? Would landowners more readily respond to a non-governmental entity such as a local land trust?
4. To what degree are landowners willing to enter into cooperative agreements? Are legally binding agreements more or less likely to be successful than those that do not require a legal commitment?

The explanatory factors examined as potentially having an impact on landowner decisions are listed in Table 1.

Table 1: Explanatory factors included in study

<b>Factor</b>	<b>Factor abbreviation</b>
<b><i>Owner demographic traits<sup>1</sup></i></b>	
Age of owner	Age
Number of children owner has	Children
Level of education attained by owner	Education level
Owner's annual household income	Income
Percent of total net worth that is invested in King County forestland	Percent of assets invested in land
Whether or not the owner lives in an urban setting	Urban residency
<b><i>Forestland factors</i></b>	
Number of acres of forestland the owner owns in King County	Acres owned
Number of different locations that make up the owner's total ownership in King County	Number of different locations owned
Number of years owner has owned land	Length of time owned
Whether or not owner lives on land	Residency on land
Whether or not forestland is enrolled in one of King County's tax-benefit programs	Enrollment in Current Use Taxation
Whether or not a management plan has been completed for the forestland	Completed forest management plan
<b><i>Landowner Values and Objectives</i></b>	
The degree of importance that the owner attributes to real estate investment as a reason for owning land	Real estate investment
The degree of importance that the owner attributes to natural and aesthetic qualities as a reason for owning land	Natural and aesthetic qualities
The degree of importance that the owner attributes to commodity and recreational use as a reason for owning land	Commodity and recreational use
The degree to which an owner agrees that her/his forestland is important to the larger landscape	Attitude toward the role of forestland in the larger landscape
Whether or not an owner has sold timber from her/his forestland or expressed an interest in doing so	Interest in timber sale
Whether or not an owner has previously sold or subdivided forestland	Previous conversion
Whether or not an owner has sold or donated a conservation easement or expressed an interest in doing so	Interest in conservation easement

<sup>1</sup> For the purpose of this study, the "owner" was identified as the person responsible for making decisions regarding the management of the forestland.

Table 1: Continued

<b><i>Past indicators of cooperation</i></b>	
Whether or not an owner has previously been involved in other types of cooperative efforts such as a homeowners association or food coop.	Previous cooperative efforts
Whether or not an owner knows the owners of the neighboring forestland	Relationship with neighbors
Whether or not an owner has discussed property related issues or worked on property related projects with the owners of the neighboring forestland	Previous work with neighbor

## Thesis Outline

Chapter 2 discusses the nationwide trends related to the urban/rural interface phenomenon, as well as the social and ecological problems that have resulted from these trends. Particular attention is given to the social conflict that has resulted from the interaction between traditional forest landowners with the "new" urban migrants that have moved to the interface.

Chapter 3 describes the physical geography of King County, Washington, as well as the land ownership patterns and the current zoning regulations established through the County's comprehensive planning process.

Chapter 4 examines land management cooperative efforts from a theoretical standpoint. This exam includes a summary of the benefits of cooperation, the factors that facilitate cooperative efforts, and the potential barriers to successful cooperation. The chapter also includes a brief discussion of the history of forestland management cooperative efforts in the United States.

Chapter 5 discusses the research methodology, the population sampled and the procedure used to identify the sample. Also discussed are the development and administration of the survey, and the procedures used in the data analysis. The chapter includes a brief discussion of the validity of attitude/behavior research.

Chapter 6 summarizes the results. This first section includes the descriptive statistics for forestland ownership patterns, ownership values and objectives, and owner demographic traits. The latter part of the chapter discusses the results of four regression analyses used to determine what factors significantly impact a landowner's decision to sell or subdivide her/his forestland or enter into a cooperative effort.

Chapter 7 examines and discusses the substantively significant results. It emphasizes important conclusions about the urban/rural interface population and the feasibility of pursuing cooperative efforts, and it compares the findings of this study to the existing research on the urban/rural interface and cooperative land management.

Chapter 8 provides policy recommendations for King County, and Chapter 9 concludes the study with suggestions for future research.

## **CHAPTER 2: THE URBAN/RURAL INTERFACE**

While this study focuses on King County, Washington, the issue of forest conversion at the urban/rural interface is not unique to this region. Rural areas across the country are experiencing a shift away from traditional farming and forestry toward urban development, as the nation is experiencing an urban-to-rural migration for the first time in history. The result is the subdivision of large parcels of privately owned land (Sample et al. 1995). The average size of private forestland ownerships is approaching seventeen acres nationwide. (DeCoster 1998).

The first section of this chapter discusses some of the factors mentioned in the literature that are causing the conversion of forestland to urban development in interface zones throughout the country. The second section examines some of the problems that result from this conversion.

### **Factors Causing the Conversion of Forestland at the Interface**

Five primary factors are causing the conversion of forestland at the urban/rural interface: 1) a growing population, 2) a deteriorating quality of life in urban centers, 3) an increase in the amount of leisure time afforded in today's society, 4) technological advances that facilitate mobility, and 5) an economic situation resulting from these four factors that is creating an opportunity for forest landowners to sell their land for high prices.

The population of the United States is growing by roughly two and a half million people per year, or one percent annually. In Washington State, the growth rate is close to eight percent in part due to the immigration of people from out of state that are attracted to the high quality of life that Washington has to offer. King County is growing at almost ten percent per year. Quite simply, this growth has resulted in a need for additional housing that is not readily available in urban areas. Increasing urban density has addressed the problem to some extent, but the availability of relatively affordable land outside of cities has led new residents and developers to build in rural areas.

The deteriorating quality of life in urban centers is causing existing urban residents to seek better quality elsewhere and move to rural areas. They seek to escape drugs, crime, congestion and a high cost of living, and they search for a better place to raise children and an easier pace of life (Shannon 1991).

Concurrently, the overall improvement in the economic status of the middle and upper classes of the population has led to an increase in the amount of leisure time, which in turn has resulted in a greater desire for recreational activities, more open space and a better quality environment (Shannon 1991). As a result, people want to live closer to forested areas. Not surprisingly, the greatest growth in rural areas has occurred in close proximity to national forests or wilderness areas (Shands 1991).

Recent technological advances, especially in telecommunications, have facilitated the movement away from urban centers by creating a population that is far more mobile

than populations of the past. Many white-collar workers no longer have to commute to work on a daily basis. They can conduct business from their homes via the internet and fax machines.

This urban-to-rural migration has caused the value of forestland to rise dramatically in response to the demand for residential property. In King County, land that has traditionally been worth roughly \$1,000/acre for the production of forest products now sells for up to \$15,000 or \$20,000/acre for residential development. This change in value has understandably motivated many traditional forest landowners, both the non-industrial private forest owners and the large forest product companies, to realize the economic potential of their land and convert it to urban uses. The result has been the fragmentation of large ownerships into multiple smaller parcels.

### **The Problems of the Interface**

Aside from the obvious impact of clearing land to build houses, a variety of indirect impacts create problems at the urban/rural interface. These problems can be divided into four categories: 1) ecological impacts on the forest, 2) impacts on the practice of forestry, 3) impacts on the new residential owners, and 4) social impacts resulting from the clash of different value systems.

The ecological impacts of urban development take three forms: 1) the introduction of pollutants that are harmful to both vegetation and water, 2) the introduction of a new type of forest landowner who is not typically educated in forest management, and 3) the fragmentation of wildlife habitat that can lead to the loss of species.

Fertilization and overwatering of lawns and air pollution from car exhaust and residential heating systems all impact the natural forest vegetation. Also, increased runoff from impermeable surfaces, and runoff polluted by petroleum products, herbicides, pesticides and septic systems degrade water quality and associated fish habitat (Bradley 1984). This is an especially significant issue in King County where several species of salmon were recently listed under the Endangered Species Act.

The introduction of new landowners who are purchasing forestland as a place to live outside the city is discussed from a social standpoint below, but this trend has ecological consequences as well. These owners are unintentionally degrading forest health because many do not understand silvicultural practices and how to manage forests for ecological purposes. Much of the forestland at urban/rural interface areas is unhealthy due to poor past management and the exclusion of fire, which has prevented natural succession. A hands-off management approach to the preservation of these forests will not result in the development of healthy natural forests, as fire will continue to be excluded in areas of residential development. Active management is necessary if these forests are to be restored to a healthy condition and provide the optimal ecological benefits possible. The influx of new owners lacking this understanding is resulting in ecologically unhealthy forests.

Recent developments in the field of landscape ecology suggest that residential development has a substantial impact on wildlife populations. While the impacts may be positive for some species, as for birds that populate open fields or gardens, the overall impact on wildlife populations is generally negative (MacLean 1997). Interaction with humans and their pets is one problem. As large mammals, such as cougars and bears, grow accustomed to human interaction, unpleasant encounters result in the destruction of individual animals that are perceived as a nuisance or a hazard. Household pets, primarily cats and dogs, are introduced as unnatural predators that alter the balance of predator-prey relationships.

The largest impact on wildlife populations may be the fragmentation of habitat (Vessels 1997). As Greenberg (1997) points out, "The structure and extensiveness of the residual forest determine whether it can provide habitat for a variety of plant and animal species. Central to viability (of species) are questions of patch size, shape, and composition, as well as other aspects of patch dynamics." Scattered residential development is likely to create habitat that is not suitable to a variety of species and also prevent movement that takes place daily or over the course of an entire lifecycle (Forman 1995). In addition, the impact on wildlife from the infrastructure development associated with residential construction can be substantial. Roads, power lines and water and sewage systems all require additional land clearing, generally in a linear pattern that further fragments the forest.

Fragmentation of forestland impacts forest practices as well. Due to economies of scale, a large forest property is economically more viable for growing trees than a small one (Krishnaswamy 1997). Ownership fragmentation decreases parcel size, thereby making it economically more challenging for owners to manage the land for timber. Fragmentation also complicates management when neighboring owners restrict access or when activities such as timber felling or log hauling are deemed incompatible with the residential development occurring on the newly created parcels (Vessels 1997).

Forestland conversion to urban development can impact new owners through damage to residences. By choosing to live in the forest, people expose their houses to tremendous risk from forest fire in areas that often are not readily served by local fire departments. Hazard trees also become an issue when landowners thin forests in the immediate vicinity of their homes. The remaining trees are often unable to withstand high winds, and the problem of trees falling on houses has become increasingly common (Bradley 1984).

Finally, social conflicts deserve close examination, as the urban/rural interface is often described as an interface of differing value systems, that of the traditional forest landowner who manages her/his land for the production of forest products, and that of the "new" rural landowner, the urban migrant who has moved to the forest to take advantage of the amenities it provides (Bradley 1984, Syrdal 1984, Vaux 1982).

Numerous studies have attempted to better understand the values and objectives of traditional private forest landowners, and it is possible to make several generalizations. To begin, traditional landowners typically have a strong sense of stewardship toward their forestland (Bliss 1997, Birch 1994, Brunson 1996, Sample et al. 1995). Many of them have grown up on the land and earned their living from it, and they have developed

a conservation ethic and an understanding of the importance of healthy forests to future generations. While many traditional forest landowners do harvest timber, studies have found that to the majority of them commodity production is of secondary importance to ecological or aesthetic values such as wildlife habitat, natural beauty or recreational activities.

Very little research has focused specifically on the ownership objectives of the "new" forest landowners, the urban migrants. However, the reasons that urbanites are moving into forested environments, discussed earlier in this chapter, suggest that these owners are also interested primarily in the natural and aesthetic values of the forest. They seek solitude and an escape from the urban environment. The production of forest products is not generally a high priority.

Interestingly, conflict seems to exist between two groups who both value the well being of the forest. However, these two groups come from different backgrounds, and they tend to value the forest in different ways. To the traditional owner, such practices as thinning and patch cuts are an integral part of forest management and improve forest health in addition to providing income. On the other hand, as Healy (1984) suggests, "many new, urban-oriented owners tend to view resource protection in preservationist terms rather than in terms of 'conservation-for-use.'" They come from urban backgrounds, and they don't understand forestry. With their limited knowledge of forest practices, they consider all timber harvesting detrimental – cutting trees is a bad thing. The fact that many of them have cleared large patches of forestland in order to build their homes is not considered when they file complaints against neighboring landowners who are harvesting timber. This irony has led to the development of "the last settler syndrome" which suggests that urban migrants want freedom to settle in forested areas until they build their homes – then they want the forest preserved. They want to be surrounded by forest, but they also want access to urban amenities (Shannon 1991).

Therefore, there are conflicts between those who choose to harvest timber and consider residential development an impediment and those who have built their homes and consider timber harvest practices a nuisance. These conflicts divide communities socially. As Lee (1991) suggests, "Land managers often assume that people who live in an interface zone will know one another, communicate about common problems, interact through work and leisure relationships, and use local governance mechanisms to solve their problems. In short, they assume communities act as cohesive units. . . (*In reality*) there is limited communication between individuals in separate social circles, and such communication is usually limited to a rather narrow segment of concerns." This separation can contribute to conflict and make cooperative efforts difficult.

In summary, the urban/rural interface presents ecological, economic and social problems, many of which are associated with the fragmentation of large forest ownerships into smaller residential parcels and the variety of landowner objectives that results from this fragmentation. Thus much of the policy development and planning efforts that have taken place throughout the country and in King County have focused on ways to keep land in large ownerships. The next chapter focuses on the specifics of King County.

### CHAPTER 3: THE STUDY AREA - KING COUNTY, WASHINGTON

In many ways, King County is a perfect example of a county plagued by the problems of the urban/rural interface. The County is situated on the west side of the Cascade Mountains in Washington State (Fig. 1). It spans from Puget Sound to the Cascade Crest and has a temperate climate with wet, mild winters and dry summers. The abundant rainfall and temperate climate create an ideal environment for conifer forests, and the region has vast expanses of conifer forest which historically covered the land from the coast up the west slope of the Cascades to timberline at roughly 6000 feet. Douglas-fir is the dominant species, but western red-cedar, grand fir, spruce and hemlock are also quite common. The area has a history of timber production, and most of the lowland area is second growth timber under 100 years old. At higher elevations, old-growth stands remain.

Urban development in the County began with the settlement of Seattle at Alki Point north of Elliot Bay in 1851. The region thrived with the Alaska gold rush at the turn of the century, and the Boeing Company began operation in 1915 and grew substantially during World War II and in the post-war boom of the 1950s and 1960s. Until recently, the economy fluctuated with the ups and downs of the aerospace industry. The growth of the technology industry, led by software developer Microsoft, has resulted in a decade of relative prosperity contributed to a dramatic rise in the population. Cities and suburbs to the east of Lake Washington have grown along with the expanding economy, and residential development has spread farther to the east, encroaching on the Cascade foothills.

Through its comprehensive planning process, the County has made a concerted effort to preserve the remaining forestland. Its 1994 Comprehensive Plan divides the County into four zones; the Urban Area, the Rural Area, the Agricultural Production District, and the Forest Production District (Fig. 1). The Urban Area extends from Puget Sound to an Urban Growth Boundary located roughly twenty miles to the east and includes additional cities scattered throughout the Rural Area. Most of the Urban Area is developed at urban densities, and the Comprehensive Plan calls for continued development in order to accommodate the growing population. With the exception of parks and urban greenbelts, the area has little forestland.

East of the Urban Growth Boundary is the Rural Area, which also includes Vashon Island to the west of Seattle (Fig. 1). This zone has traditionally been used for agriculture and forestry and the rural residential development necessary to support these lifestyles. Much of the land is still forested or devoted to agriculture, and the County has zoned almost all of it with maximum densities of one home per five or ten acres. The majority of the land is privately owned by either individual or corporate entities, but King County and Washington State also manage a number of large parcels. Within the Rural Area, the County has designated a Rural Forest District.<sup>2</sup> This district consists of areas

---

<sup>2</sup> For the purpose of monitoring forest retention, King County completed an analysis of the Rural Forest District in 1998 and made minor adjustments that were not incorporated into the Comprehensive Plan. The adjusted district was used for this study.



with a large number of contiguous forested parcels (Fig. 1). Most of the land area is in parcels of 20 acres and larger, but smaller parcels (4-10 acres) are scattered throughout. The Rural Forest District covers 22.4 percent of the Rural Area. The District is not subject to specific zoning regulations but rather is an area where the County is focusing its technical assistance and incentive efforts to preserve forestland.

Not surprisingly, the Rural Area is under a great deal of development pressure, and the ownership pattern is changing rapidly. An increasing population is looking for places to live, and the strong economy is enabling these new residents to purchase large tracts of land for residential development. Furthermore, the proximity of the Rural Area to the job market allows for a relatively easy commute.

The Agricultural Production District is mostly within the boundaries of the Rural Area (Fig. 1). It consists primarily of the large Snoqualmie River Valley and the Enumclaw Plateau to the South, both areas characterized by agriculturally productive soils.

The Forest Production District (FPD) covers most of the County east of the Rural Area to the crest of the Cascade Mountains. The District is zoned for one home per eighty acres, but portions of it consist of smaller lots created prior to the establishment of the zoning regulation. Much of this land is publicly owned,<sup>3</sup> but large tracts are also owned by private industry, primarily Weyerhaeuser Company and Plum Creek Timber Company. Residential development has recently become an issue in the FPD along its western edge and in isolated pockets along major highways, as large private owners seek to realize the economic potential of their land.

As is apparent from the Comprehensive Plan, private forestlands, both industrial and non-industrial, make-up an important component of King County's landscape - in many ways defining the County's character. Private forests support the economy through the production of timber and other forest products and also provide a natural, aesthetic backyard to urban and rural communities. They enhance the region's water and air quality and provide habitat for a variety of wildlife species. In conjunction with publicly managed forests, they supply a variety of recreational opportunities.

Many of the issues discussed in Chapter 2 are relevant to both the Rural Area and parts of the Forest Production District in King County. New owners are buying parcels of five to twenty acres and larger with the intent of building a home on the land. This pattern is resulting in the fragmentation of previously large forestland ownerships and the resulting problems discussed in Chapter 2. Forestland is being taken out of production due to negative economies of scale and conflict with residential owners. Salmon habitat has been impacted, which has contributed to the decline of certain Puget Sound salmonid species and their subsequent listing under the Endangered Species Act. Also, stories of windstorms causing residential damage and cougars killing household pets are reported frequently in the media. The social conflict, while less tangible, is evident in the politics of the situation as the traditional forest owners and the new urban migrants, along with

---

<sup>3</sup> The United States Forest Service manages much of the public land as part of the Mt. Baker-Snoqualmie National Forest. The Washington State Department of Natural Resources manages the state trust lands, and the City of Seattle administers the Cedar and Tolt River Watersheds.

the developers and environmental groups, take sides in attempts to plan for the future of the area.

## **CHAPTER 4: COOPERATIVE FORESTLAND MANAGEMENT**

In order to discuss the feasibility of cooperative forestland management, a clear definition is needed of what a cooperative is and what cooperative land management efforts involve. Yarrow (1990) provides a concise summary as follows, "Wildlife/timber landowner cooperatives are groups of individually-owned private land tracts joined together as one contiguous unit for the common purpose of managing people, wildlife and timber for profit. By joining land tracts, landowners can gain some of the benefits of a larger landowner for managing people, wildlife and timber but at the same time retain their individual rights as landowners. Larger blocks of managed land increases the value of forested land to timber buyers and also makes the land more desirable for fee hunting, camping, canoeing, hiking, bird watching and other recreational activities."

### **Benefits of Cooperative Land Management**

Cooperative land management has the potential to provide many benefits to forest landowners, regardless of their management objectives. These benefits may be economic, ecological, or social. From a timber production standpoint, cooperatives can improve productivity by creating economies of scale (Cromwell 1984, Barton 1989). Owners have the ability to pool their resources for the efficient purchase or lease of equipment and materials (Knight 1998). As Barton (1989) suggests, "Combining the activities of several owners results in cheaper per-acre treatment for planting, stand improvements, harvest and other forest operations." In addition, participants can join forces to collectively market their products and reduce duplicate efforts in this stage of the process. The larger-scale operation also may provide for a more frequent income and allow landowners the flexibility to take advantage of market fluctuations (Matthei 1984). If properly structured, cooperatives can also reduce income taxes and lower estate and property taxes (Williams 1997).

Ecologically, cooperatives can consolidate land into large management units that enable owners to reduce the impact of haphazard fragmentation that can occur when individual parcels are managed separately. Managing across large landscapes allows owners to create a diversity of habitat types without creating too much edge habitat and eliminating interior forest (Campbell 1996). Management at large scales can also ensure that cumulative impacts to watersheds are avoided, as management activities can be spatially and temporally coordinated to offset these impacts.

In areas where forestland is under development pressure, cooperative efforts can limit development if neighboring landowners agree to sign conservation easements that ensure the preservation of forest across a large area. Such easements might also ensure that development takes place in an aesthetically pleasing and ecologically sound manner. Cooperative management can also contribute to the creation of recreational opportunities that would not otherwise be available, such as longer trail systems.

Finally, cooperatives can serve an educational function by involving landowners who have a limited knowledge of forest management. This type of owner may be hesitant to work with an unknown forestry consultant but might readily work with familiar neighbors (Barton 1989). In this sense, a cooperative can serve as a way of generating interest among landowners and improving the management of individual parcels.

## **History of Cooperative Land Management Efforts**

It is interesting that the above definition of a cooperative discusses the management of "people, wildlife and timber." Only recently has the focus of cooperative efforts begun to incorporate values other than timber, as is clear from the history of cooperatives in the United States.

In the years following World War II and prior to 1960, timber management and marketing cooperatives were quite prevalent in the United States. Various estimates suggest that there have been between 70 and 200 forestry cooperatives established in the United States in the 20th century (Barton 1989, Ewing 1981, Knox 1969, Cliff 1968). However, these cooperatives focused almost entirely on the management and marketing of timber products.

With the emerging philosophy of ecosystem management in the 1990s, land management cooperatives have changed their focus from timber production to a broader look at ecosystem health. Landowners are beginning to understand that the benefits of landscape planning go beyond timber production and include other values such as wildlife habitat, recreation and aesthetic amenities. Most of the documented efforts have taken place in the New England states. In Vermont, a consulting forester worked with the Coverts Program and received grants from the Vermont Stewardship Committee and Windham Foundation to develop a wildlife management plan for 4600 acres in 42 different ownerships (Weir 1992). The included landowners formed what they called a Wildlife Habitat Improvement Group and, with the assistance of the consulting forester, developed a plan to enhance habitat across the landscape. Timber production was not an objective of the effort.

In Massachusetts, a forester with the State Cooperative Extension program initiated an effort to create Stewardship Neighborhoods in which 3 or more neighboring landowners with individual forest plans could obtain increased cost-share benefits by developing a "cooperation checklist." In the first nine months of the program, two Stewardship Neighborhoods had formed involving 8 landowners and 457 contiguous acres (Campbell 1996).

In New Hampshire, the Institute for Community Economics, in conjunction with the Society for the Protection of New Hampshire Forests and the Monadnock Community Land Trust, formed a Forestland Trust in which twenty-one landowners committed 5190 acres of land to a cooperative effort focused on the sustainable production of forest products (Matthei 1984).

These three efforts had varying degrees of success and stimulated research into the factors that may help or hinder future efforts. Research by Brunson (1998), Knight (1998), Rickenbach et al. (1998), Sample (1994, 1995), Washburn (1996), Williams and Ellefson (1997), and Yaffee (1998) has provided a better understanding of the factors -- independent of individual landowner characteristics, values and objectives -- that might facilitate or hinder cooperative efforts.

### **Factors that Facilitate Cooperative Land Management**

Among factors facilitating cooperation, perhaps the best supported is the belief that people cooperate because they have something to gain, not out of a desire to do the right thing (Yaffee 1998, Sample 1994). As Sample et al. (1995) suggested, "Heterogeneous people come together because there is a need, not because they have an inherent desire to work together. Having a common problem makes it possible for people with different objectives, interests and approaches to begin the process of collaboration. Partnerships require enormous investments of time and energy; groups and individuals will not participate if they do not perceive future benefits." This statement suggests that landowners must clearly understand how they will benefit from a cooperative effort. They are not likely to participate without this understanding.

Another accepted theory suggests that peoples' willingness to cooperate is governed to a large extent by their expectation of how others involved in the effort will behave (Brunson 1998). People are more likely to enter into cooperative efforts if they feel certain as to the motivations of the other people or groups involved. This theory emphasizes the importance of open communication to the success of cooperative efforts. The theory also emphasizes the need to include, or at least invite, all potential participants at the beginning of the process.

With regard to the structure of a cooperative, Rickenbach (1998), Williams (1997), and Sample (1994) suggested that some semblance of organization is necessary but that an informal structure not requiring a commitment is most likely to be successful. Rural landowners often feel more comfortable working in ad-hoc partnerships rather than formal organizations. This preference may result because of a sense that informal partnerships are less binding and do not limit opportunities in the future.

Financial and technological resources are important to success. Without the financial resources to purchase equipment and materials, hire technical assistance, provide the necessary infrastructure, or possibly compensate the time expended by those leading the effort, a cooperative is not likely to endure. Technological resources, primarily in the form of geographic information systems (GIS), were emphasized by Campbell (1996) and Weir (1992). The ability to graphically represent the benefits of a cooperative effort and coordinate a management plan across boundaries is made far easier by this technology.

Perhaps the most commonly cited and strongly emphasized factor contributing to the success of a cooperative effort is the need for a leader or catalyst organization. Barton went so far as to suggest that without an "entrepreneur" a cooperative will not

form (Barton 1989). The leader, whether an individual or representative of an organization, serves a number of functions. S/he identifies and articulates the goals of the cooperative on a landscape scale, identifies the key landowners that have the potential to help the cooperative, organizes and facilitates meetings, and provides technical assistance that enables landowners to understand the role that their land plays in the larger landscape and to plan accordingly. If the leader represents an outside organization, such as a government agency, extension service or non-profit group, s/he may be in a position to provide important resources (such as GIS technology) or facilities (Sample 1994).

The leader may emerge from any of several different places. An individual landowner may take the lead in order to achieve an individual goal that is facilitated by a cooperative effort. This goal may be decreased production costs in the case of a traditional forest owner harvesting timber or increased preservation of the surrounding area for the residential landowner. In some cases, a representative of a government agency may take the lead in order to achieve the goals established by the agency or local government planning body. Other potential leaders include independent forest consultants who may see cooperatives as a way of generating business, a timber company that may hope to gain access to the timber produced, or a non-profit conservation organization that hopes to achieve ecological goals through the management of larger landscapes.

### **Potential Barriers to Cooperative Land Management**

Many of the barriers to cooperative efforts result from absence of the critical elements mentioned above. Different objectives among landowners, inadequate resources, or no leader/catalyst organization can result in unsuccessful attempts at cooperation to manage land. In addition, researchers have identified several other factors that often hinder the formation of cooperative efforts. Foremost among these factors is the emphasis on private property rights that pervades many rural areas (Knight et al. 1998, Brunson 1998). Especially in the western United States, but in other areas of the country as well, rural inhabitants tend to have strong feelings that decisions regarding their property should be made at their discretion and not be impacted by outside authority. By definition, cooperative efforts require that each landowner relinquish a certain amount of autonomy in the decision making process. The unwillingness of landowners to relinquish this autonomy may explain why informal partnerships have been more successful than more structured organizations and illustrates the need to make it clear to landowners that the cooperative effort is voluntary and does not necessarily require a binding commitment.

Federal anti-trust legislation is also noted as a barrier to cooperative efforts that involve the generation of income from forest products (Sample 1995, Williams 1997). While this legislation pertains primarily to large ownerships, it can impact any cooperative and may deter landowners who are already skeptical of cooperative efforts.

Given the work required to create and manage a cooperative, a lack of time is mentioned repeatedly as a barrier to successful efforts (Washburn 1996, Williams 1997).

Particularly if landowners do not see the direct benefit of participation, they may not wish to devote the time required to participate. This potential barrier illustrates the need for a leader and the resources to facilitate the effort so as to minimize the time commitment required by participants.

The next chapter outlines the methodology used to study landowners at the urban/rural interface of King County in order to understand their reasons for selling or subdividing their forestland and the probability of their entering cooperative efforts.

## CHAPTER 5: METHODOLOGY

Methodology is discussed below in four sections: 1) the population on which this study focused and the sampling procedure used in the distribution of the survey, 2) an analysis of the survey instrument, 3) the procedures used to analyze the data collected with the survey, and 4) the validity of attitude/behavior research, the premise on which this study was conducted.

### Population and Sampling Procedure

The study focused on King County forest landowners in three parts of the County: the Rural Forest District, Vashon Island, and parcels in the Forest Production District that are smaller than 100 acres and within one mile of the Rural Area boundary (Fig. 2). These areas were chosen because they comprise the area of King County's urban/rural interface, outside the urban growth boundary, that is experiencing the greatest development pressure. This population was defined using data on forest ownership that is maintained in King County's geographic information system (GIS).<sup>4</sup> The procedures used to define the population in each of the three areas are described below.

The Rural Forest District consisted of a total of 1,830 parcels 4 acres and larger owned by 1,136 different owners. Parcels smaller than four acres were not included because it was judged that they were too small to be managed for forestry. This cut-off was established by County planners when the Rural Forest District was designated.

Table 2 shows parcel sizes and ownerships for the Rural Forest District with divisions corresponding to those used in the County's 1996 Rural Forest Monitoring report (King County 1996), an annual report documenting changes in forest cover in the Rural Forest District. Landowners owning multiple parcels of various sizes were included in the category of their largest ownership.

Table 2: Parcel size (acres) and ownership in the Rural Forest District, King County, Washington, 1996.

Parcel Size	# of parcels	% of parcels	# of owners	% of owners
4-7.49	503	27	407	36
7.5-17.49	250	14	206	18
17.5-19.99	97	5	65	6
20-39.99	784	43	363	32
40-99.99	156	9	72	6
100-499.99	35	2	19	2
500 and up	5	<1	4	<1
Total	1830	100	1136	100

<sup>4</sup> The King County GIS data pertaining to forest cover was completed in 1997. A fair amount of ownership change has occurred since then that has not been incorporated into the GIS system. Therefore there were limitations in the data. However, for the purposes of this study, the GIS data was considered satisfactory.



For Vashon Island, forest cover analysis was completed in 1998 using satellite imagery and airphoto interpretation, but no forest district had been designated on the island when this study was initiated. Therefore, the author defined a "Vashon Forest District" by intersecting forest cover data and parcel-size data for the island, i.e. by combining the two GIS data layers. The resulting map showed all parcels with at least 65 percent forest cover. Using this map, the author designated a forest district that included areas where contiguous parcels resulted in large tracts of forest. This effort resulted in 217 parcels owned by 184 different owners creating the "Vashon Forest District" (Fig. 3 and Table 3).

Table 3: Parcel size (acres) and ownership in Vashon Forest District, King County, Washington, 1999

<b>Parcel Size</b>	<b># of parcels</b>	<b>% of parcels</b>	<b># of owners</b>	<b>% of owners</b>
4-7.49	63	29	58	32
7.5-17.49	37	17	34	18
17.5-19.99	35	16	29	16
20-39.99	64	30	50	27
40-99.99	14	6	9	5
100-499.99	4	2	4	2
500 and up	0	0	0	0
<b>Total</b>	<b>217</b>	<b>100</b>	<b>184</b>	<b>100</b>

The population of the Forest Production District included parcels from four to one hundred acres in size within one mile of the Rural Area boundary (Fig. 2). Parcels larger than 100 acres in size were excluded because the vast majority are owned by large timber companies and for the most part are not yet being converted to residential development. There were 713 parcels in this category and 231 different owners (Table 4).

Table 4: Parcel size (acres) and ownership for parcels in the Forest Production District from 4 to 100 acres in size and within one mile of the Rural Area boundary, King County, Washington, 1996

<b>Parcel Size</b>	<b># of parcels</b>	<b>% of parcels</b>	<b># of owners</b>	<b>% of owners</b>
4-7.49	88	12	66	29
7.5-17.49	90	13	53	23
17.5-19.99	61	9	16	7
20-39.99	315	44	64	28
40-99.99	158	22	31	13
100-499.99	1	<1	1	<1
500 and up	0	0	0	0
<b>Total</b>	<b>713</b>	<b>100</b>	<b>231</b>	<b>100</b>



The total population consisted of 1551 owners when the three study regions were combined. If owners owned land in more than one of the areas, all but their largest holding were removed from this total, and they were placed in the parcel-size category of that holding for the purpose of sampling. Corporate landowners and government landowners were also removed, as they are not considered non-industrial owners and thus did not meet the criteria for this study. This screening reduced the effective population size to 1256 landowners in the entire study area (Table 5). From this population, 833 owners were selected using parcel identification numbers and a proportional stratified random sample based on parcel size. Stratification was used based on the belief that the likelihood of selling or subdividing land or entering into a cooperative effort would vary depending in part on the amount of land owned.

Table 5: Parcel size breakdown of total population and sample

<b>Parcel Size</b>	<b># of owners in population</b>	<b># of owners in sample</b>	<b>% of owners in sample</b>
4-7.49	463	307	36
7.5-17.49	222	147	18
17.5-19.99	72	48	6
20-39.99	413	274	33
40-99.99	86	57	7
100-499.99	0	0	0
500 and up	0	0	0
<b>Total</b>	<b>1256</b>	<b>833</b>	<b>100</b>

These 833 selected parcel identification numbers were given to the King County Department of Development and Environmental Services, which provided current ownership names and addresses. Of the 833 submitted, seven were removed as being associated with road rights-of-way. An additional four were removed because the new owners were already included in the sample or the land had been transferred into state ownership. The final number of owners to be sampled was thus 822.

## **The Survey**

The survey instrument (Appendix 1) was designed using Dillman's Total Design Method (Dillman 1978), which outlines a strategy for achieving a high response rate. Prior to distribution, the survey instrument was evaluated by employees at the King County Resource Lands office and a group of thirty forestland owners who were participating in a King County sponsored Forest Stewardship Planning class. Their comments were used to revise the survey.

The survey was sent via first class mail with a cover letter (Appendix 2) printed on University of Washington College of Forest Resources letterhead on March 8, 1999. A business reply envelope was included addressed to the College of Forest Resources. A

reminder postcard (Appendix 3) was sent one week after the initial mailing, and a second survey with a revised cover letter (Appendix 4) was sent three weeks after the initial mailing to those who had not yet responded. Responses were received throughout March, 1999, and data were analyzed beginning April 12, 1999. Thus survey recipients were given one month to complete and return the survey.

The survey consisted of three sections: 1) questions regarding forestland ownership and owner actions, 2) questions related to the recipients' land management values and objectives, and 3) demographic questions such as age and income. The opening question asked the recipient whether or not s/he currently owned forestland in King County with at least one parcel larger than 4 acres and defined forest as referring to "any area of one or more acres that is at least 65 percent covered by trees." The question also stated that harvested areas should be considered as forest if they have been replanted and are in the process of regrowing. While this definition leaves some room for interpretation, it provides enough clarity that a landowner with land only in an agricultural or suburban area would likely not respond.

Questions regarding forestland ownership focused on the amount of land owned, the duration of ownership, and residency. Questions about the owner's past actions related to the land addressed the completion of a forest management plan, enrollment in County tax benefit programs,<sup>5</sup> timber sales, and previous sale or subdivision of forestland.

The section on landowner values and objectives used a combination of Likert scales and individual questions addressing management objectives, the owners' attitudes toward the importance of their forestland as part of the larger landscape, and the owners' intentions for the future of their land in terms of selling or subdividing and/or entering into cooperative efforts. This section also included four questions specific to the owners' past involvement in cooperative efforts.

Three sets of questions included in this section merit further discussion. The first set is a scale designed to measure the landowners' attitudes about the importance of their forestland as part of the larger landscape. This scale was based in part on the work of Rickenbach et al. (1998), who explored attitudes toward an ecosystem-based approach to management. It is hypothesized that respondents with a high score on this scale would be less likely to sell or subdivide their forestland and more likely to enter cooperative efforts due to an understanding of the environmental importance of their forestland as part of the larger landscape. The scale was composed of eight statements to which respondents were asked to select whether they strongly disagree, disagree, agree, or strongly agree.

Two other sets of questions were designed to measure landowner intentions. In one set, the landowner was presented with eight hypothetical situations in which s/he

---

<sup>5</sup> King County offers forest landowners three tax programs in which they may enroll their land in order to achieve a substantial tax break in return for guaranteeing that the land will be managed as forest for a certain amount of time. Forestland taxation is available to landowners with at least 20 acres of land devoted to forestry. Timberlands taxation is available to landowners with between 5 and 20 acres of forest and requires a forest management plan. Typically, a property in the Timberlands Program has some acreage reserved for a homesite or agricultural area, and the remaining acreage is managed for forestry and enrolled in the program. The Public Benefit Rating System (PBRs) provides a tax benefit to landowners willing to maintain their land for a variety of public values, one of which is the maintenance of forestland.

might be impelled to sell or subdivide land. The owner was asked to select a number between 1 and 5 indicating how likely s/he would be to sell or subdivide if any of the situations were to occur in the next five years. In the other set, the landowner was presented with nine hypothetical situations in which s/he might be impelled to become involved in a cooperative effort (Rickenbach 1997). The owner was asked to select a number between 1 and 5 indicating how likely s/he would be to cooperate. The responses to the questions in these two sets were used throughout the study to represent the expected behavior of the respondents based upon their stated intentions. The discussion below about attitude/behavior research explains in further detail the validity of this research method.

Finally, to determine the demographic traits of the owners, the third section of the survey asked their age, education level, number of children, income, and the percentage of their total assets invested in their forestland.

## **Data Analysis**

Aside from the use of standard descriptive statistics, this study used five more advanced statistical tools: rank correlation with Spearman's rho test of significance, cross-tabulation with Chi-square test of significance, exploratory factor analysis, Cronbach's  $\alpha$ , and multiple regression analysis. All of the data analysis was done using SPSS for Windows. Missing values were replaced by the mean, and variables with a large number of missing values were controlled for in the regression analyses using dummy variables.

Cross-tabulation and rank correlation are methods of determining the existence of significant relationships. These tools were used to examine the relationship between the duration of ownership and (1) amount of land owned, (2) annual household income, (3) past sale of timber, and (4) whether or not an owner lives on her/his land. These relationships were examined to determine if in fact there are significant differences between traditional forest owners and "new" owners with regard to these variables, as the literature suggests.

Factor analysis is a technique for analyzing a large number of interrelated variables to determine a limited number of dimensions or factors (Nachmias 1996). This tool was used to analyze four sets of questions that were developed to measure landowner values and objectives, reasons for selling or subdividing land, and reasons for entering a cooperative effort. Principal axis factoring was used to extract the factors. Varimax rotation (an orthogonal rotation) with Kaiser normalization was used to make the factors more interpretable (Bryman et al. 1997). A cut-off loading factor of .3 was required for an individual item to be loaded onto any specific factor. Final factor selection was based on the interpretability of the results.

Cronbach's  $\alpha$  measures the reliability of a measurement scale by analyzing whether or not individual items in a scale are measuring the dimension that they are intended to measure. Cronbach's  $\alpha$  is based on the covariances among the items taken together and has a range from zero to one. High values of Cronbach's  $\alpha$  ( $>0.7$ ) are good

while low values ( $<0.5$ ) suggest poor reliability. Cronbach's  $\alpha$  was used to measure the reliability of each of the factors that resulted from the exploratory factor analyses.

Finally, multiple regression analysis measures the relative importance of independent variables by measuring each variable against the dependent variable while holding all of the other variables constant. This study uses multiple regression as a scanning technique. Scanning involves the analysis of a data set not for testing a hypothesis but rather for exploring possible relationships in an attempt to develop testable theory or hypotheses. As Studenmund (1997) suggests, "as a means for stimulating fresh thinking or influencing thinking about substantive issues, scanning may have even more potential than does classical hypothesis testing."

### **Attitude/Behavior Research**

There has been a great deal of investigation into the validity of attitude/behavior research, and as summarized here, it justifies the use of the above-mentioned scales as indicators of future land conversions or entry into cooperative efforts. In a study of this nature, it is difficult to determine the behaviors of the respondents because in most cases they have not yet sold or subdivided their land or been involved in a cooperative land management effort. It is therefore necessary to ask respondents what they would do in given situations. The theory of reasoned action developed by Ajzen and Fishbein (1980) supports this research strategy. The theory is based on the assumption that people are generally rational and will make use of the information available to them and, barring unforeseen events, will usually act in accordance with their intentions.

The theory posits that behaviors consist of four components: action target, context, and time. In order to predict a person's behavior based on her/his intention, it is necessary to measure her/his intention relative to the same action, target, context and time as the predicted behavior. To use an example provided by Ajzen and Fishbein (1980), we cannot predict that a person is likely to drink Budweiser at the local bar on Friday night simply because that person states that s/he drinks beer. Only the action of drinking beer corresponds with the behavior the researcher is trying to predict and the person's statement that s/he drinks beer. Rather the researcher needs to know if the person would drink (the action) Budweiser (the target) at the local bar (the context) on Friday night (the time). To the extent possible, the situations in the survey instrument for this study were developed to include these four components of behavior. For example, respondents were asked if they would cooperate (the action) with neighboring landowners (the context) to design and construct a trail (the target) at the present time (the time).

The issue of time was somewhat difficult to incorporate in this study because the behavior being measured is not going to take place at a specific time, as would be the case in, for example, a political election. Rather, respondents are being asked whether they would sell or subdivide their land in the next five years. In the case of cooperative efforts, they are being asked if they would cooperate today, but the opportunity may not present itself for quite some time. Intentions can change over time, and this makes long-range predictions more difficult. However, this study analyzes the population on King

County's urban/rural interface, not an individual's behavior, and as Ajzen and Fishbein point out, "aggregate intentions are apt to be much more stable over time than are individual intentions (Ajzen 1980)."

## CHAPTER 6: RESULTS

Results of the study are presented in three sections: 1) a summary of the response rate, 2) a description of the population at the urban/rural interface, and 3) an analysis of the factors that relate to a landowner's decision to sell or subdivide forestland or enter into a cooperative effort.

### **The Response Rate**

Of the 822 surveys sent out, 50 were returned by the U.S. Postal Service as non-deliverable, effectively decreasing the sample size to 772. Of these 772 surveys, 381 were returned, for a response rate of 49.3 percent. Of the 381 who responded, 53 stated that they did not own forestland as defined in the survey. Of the 391 non-responders, 8 returned blank surveys, 4 sent notes declining to respond, and 9 called to decline for various reasons. The 370 owners who presumably received the survey and either chose not to respond or simply never got around to doing so create a possible non-response bias. However, parcel sizes, the only factor known for the 822 landowners initially selected, were distributed in a very similar pattern among respondents and the total population sampled, suggesting that respondents were representative of the total population.

### **Forest Landowners at the Urban/Rural Interface**

This section presents the results pertaining to: 1) forestland ownership patterns, 2) owner values and objectives, 3) owner intentions, 4) owner previous involvement in cooperative efforts, and 5) owner demographic traits. The section also presents the results of the rank correlations and cross-tabulations used to determine if there are significant differences between traditional owners and "new" owners.

#### *Forestland ownership patterns*

*Size and number of ownerships.* Table 6 shows the pattern of forestland ownership in King County by acreage categories. A few large ownerships made the mean (122 acres) much larger than the median (14 acres). Eighty-nine percent of the respondents (n=325) owned land in only one location within the County.

Table 6: Distribution of owners by amount of land owned (n=323)

Acres	Number of owners	Percentage of owners
4-7.49	103	31.9
7.5-17.49	66	20.4
17.5-19.99	14	4.3
20-39.99	69	21.4
40-99.99	55	17
100-499.99	7	2.2
500 and up	9	2.8
Total	323	100

*Duration of ownership.* Table 7 shows a fairly even distribution of ownership duration across the five categories into which the responses were coded. The average length of time respondents had owned their land was 18.2 years.

Table 7: Number of years owner has owned land (n = 328)

Years owned forestland	Number of owners	Percentage of owners
5 years or less	85	25.9
6-10 years	53	16.2
10-20 years	88	26.8
20-50 years	83	25.3
More than 50 years	19	5.8
Total	328	100

*Residency.* Table 8 shows the number of respondents living in different types of settings. Fifty-two percent of the total (n=326) lived on their forestland, and of those who did not live on their land (n=155), 5.5 percent reported maintaining a second home on it.

Table 8: Types of settings in which respondents currently live (n=304)

Type of setting	Number of owners	Percentage of owners
City/urban environment	39	12.8
Suburb	43	14.1
Non-forested rural setting	20	6.6
Forested rural setting	198	65.1
Other	4	1.3
Total	304	100

*Tax Programs, Management Plans, Timber harvest and Previous Sale or Subdivision.* Twenty-eight percent of the respondents have enrolled their land in one of three County tax benefit programs: 15.5 percent in Forestlands, 4.4 percent in Timberlands, and 7.9 percent in PBRs (Table 9).

Table 9: Enrollment in King County tax programs  
(n = 317)

<b>Tax program</b>	<b>Number of owners</b>	<b>Percentage of owners</b>
Forestlands	49	15.5
Timberlands	14	4.4
PBRs	25	7.9
None	229	72.2
Total	317	100

Twenty-two percent of the respondents (n=326) have completed a management plan for their forest either on their own or with assistance from a forester. Thirty-one percent of the respondents (n=325) have sold timber from their land in the past, and of those who have not (n=201), 16.5 percent said they would be interested in doing so in the future.

Finally, 9.5 percent of the respondents (n=326) have previously sold or subdivided some of their King County forestland.

### *Values and objectives*

*Management objectives.* Management objectives were examined by asking each owner to rate twelve possible reasons for owning land by circling a number from 1 to 5 with 1 being "Unimportant" and 5 being "Very important" (Table 10).

Table 10: Landowner Ratings of Possible Management Objectives  
(1 - 5 scale, 1 = Unimportant, 5 = Very Important)

<b>Reason for owning land</b>	<b>Mean Rating</b>	<b>St. dev</b>
Privacy associated with a rural quality of life (n=309)	4.44	1.05
Scenic beauty or aesthetic values (n=303)	4.31	1.08
Provision of wildlife habitat (n=301)	3.94	1.16
Let nature take its course (n=283)	3.36	1.26
A legacy for my children (n=303)	3.34	1.57
Investment opportunity from resale of land (n=304)	3.07	1.47
Non-motorized recreational use (n=299)	2.42	1.52
Personal use of wood products (n=304)	2.25	1.32
Income from timber production (n=300)	2.01	1.30
Eventual commercial development or subdivision (n=296)	1.89	1.28
Income from non-timber sources (n=293)	1.65	1.05
A place to ride off-road vehicles (n=292)	1.35	.86
Other (n=39)	4.36	1.29

Factor analysis was used to group responses into factors that represent underlying reasons for owning land. The analysis provided three distinct factors, which were identified as 1) natural and aesthetic qualities, 2) real estate investment, and 3) commodity and recreational use (Table 11).

Table 11: Reasons for Owning Forestland: Rotated Factor Matrix (Bold print indicates the reasons that were maintained for each factor)

<b>Reason</b>	<b>Factor 1 - Natural and aesthetic qualities</b>	<b>Factor 2 - Real estate investment</b>	<b>Factor 3 - Commodity and recreational use</b>
Scenic beauty or aesthetic values	<b>.766</b>	-.145	-.087
Provision of wildlife habitat	<b>.742</b>	-.137	.136
Privacy associated with a rural quality of life	<b>.635</b>	-.134	.158
Let nature take its course	<b>.540</b>	-.157	-.091
Eventual commercial development or subdivision	-.219	<b>.856</b>	-.020
Investment opportunity from resale of land	-.188	<b>.639</b>	.166
Personal use of wood products	.200	.011	<b>.717</b>
Income from timber production	-.323	.284	<b>.552</b>
Non-motorized recreational use	.329	-.068	<b>.336</b>
Income from non-timber sources	.016	.244	<b>.326</b>
A place to ride off-road vehicles	.040	-.024	<b>.308</b>
A legacy for my children*	.258	-.050	.261

Extraction Method: Principle Axis Factoring

Rotation Method: Varimax with Kaiser Normalization

\*This reason was not included in any of the factors due to its low loading values.

Each factor was analyzed for internal reliability using Cronbach's  $\alpha$ . The relative importance of each factor was calculated by averaging the mean responses for the individual questions that made up the factor (Table 12).

Table 12:  $\alpha$ s, means and standard deviations for each of the factors derived from the factor analyses of management objectives

<b>Factor</b>	<b><math>\alpha</math></b>	<b>Average mean</b>	<b>Average St. Dev.</b>
Natural and aesthetic qualities	.75	4.04	.84
Real estate investment	.74	2.46	1.23
Commodity and recreational use	.52	1.92	.72

The  $\alpha$ s indicate a high level of internal validity for the natural and aesthetic qualities factor and the real estate investment factor, suggesting that these underlying reasons for owning forestland do indeed exist. The internal validity of the commodity and recreational use factor is more suspect, suggesting that this factor may not represent a single underlying reason for owning land. It may be that owners differentiate between

commodity production and recreational use, although this was not apparent in the factor analysis.

The average means for the three factors clearly indicate that natural and aesthetic qualities are more important than either real estate investment or commodity and recreational use as reasons for owning forestland.

To further gauge the importance that landowners place on forestland preservation as an objective, the survey included two questions regarding conservation easements. Eight percent of the respondents (n=320) had sold or donated a conservation easement on their land in the past, and of those who had not (n=267), 35.6 percent said that they would be interested in doing so in the future.

*Attitude toward importance of forestland as part of the larger landscape.* When asked to choose which of three statements best describes their belief regarding urban development and forestland in the County, 65.4 percent (n=312) of the respondents chose that "the rate of forest conversion to other land uses is a serious problem." Fifteen percent chose that "there is plenty of forestland and room for development," and 8.3 percent chose that "forest conversion may be a problem, but economic development is more important." Twelve percent of the respondents selected "other" and filled in their own individual beliefs.

Table 13 presents the results of the scale of eight questions measuring the landowners' attitudes about the importance of their forestland as part of the larger landscape. Most of the responses fell above 3 on a scale of 1 – 4, indicating that these landowners understand the importance of their forestland as part of the larger landscape.

Table 13: Scale measuring attitudes toward the role of forestland as part of the larger landscape (1 – 4 scale, 1 = Strongly Disagree, 4 = Strongly Agree)

<b>Statement</b>	<b>Mean Rating</b>	<b>Standard deviation</b>
Forests and woodlands benefit the whole county. (n=318)	3.6	.58
My land is part of a much bigger natural system. (n=316)	3.4	.71
What I do on my land affects others. (n=314)	3.3	.75
My land provides important wildlife habitat. (n=315)	3.4	.69
Wetlands are beneficial to our society. (n=303)	3.3	.77
My property is insignificant in the big picture of all land in King County. (n=307)	2.7*	.87
What I do on my land will matter in the long term. (n=316)	3.2	.71
What my neighbors do on their land affects me and my land. (n=316)	3.5	.67

\*This value is the result of converting the original value of 2.3 to a positive equivalent.

Factor analysis of this scale resulted in all of the questions grouping into only one factor (Table 14), suggesting that the scale as a whole was a good measure of landowner attitudes toward the importance of their land as part of the larger landscape. Cronbach's  $\alpha$  was used to establish internal reliability, and the scale proved very reliable with an  $\alpha$  of .87. The mean score across all eight questions was 3.29 with a standard deviation of .52.

Table 14: Factor analysis of attitude toward the role of forestland as part of the larger landscape

<b>Belief</b>	<b>Factor 1</b>
What I do on my land affects others.	.838
My land is part of a much bigger natural system.	.818
My land provides important wildlife habitat.	.715
What my neighbors do on their land affects me and my land.	.709
What I do on my land will matter in the long term.	.673
Forests and woodlands benefit the whole county.	.658
Wetlands are beneficial to our society.	.638
My property is insignificant in the big picture of all land in King County.	.413

Extraction Method: Principle Axis Factoring

### *Intentions*

Landowners were asked to select which of six possible responses best describes their plans for their forestland in the next 10 years, barring unforeseen circumstances (Table 15).

Table 15: Respondents' intended plans for forestland (n=320)

<b>Intention</b>	<b>Frequency</b>	<b>Percentage</b>
To preserve the land in its current condition	90	28.1
To build a home on the land but not subdivide it into smaller parcels	66	20.6
To subdivide or sell the land when economic conditions are optimal	54	16.9
To subdivide or sell the land only if economic pressures force me to do so	46	14.4
To manage the land as a working forest	28	8.8
To will the land to my heirs and let them decide what to do with it.	22	6.9
Other	14	4.4
Total	320	100

*Owner intentions to sell or subdivide forestland.* A series of eight questions asked how likely respondents would be to sell or subdivide their forestland if any of eight situations were to take place in the next five years, using a scale of 1 to 5 with 1 being "Very unlikely" and 5 being "Very likely" (Table 16).

Table 16: Likelihood of respondents selling or subdividing their forestland in the next five years if any of the following situations were to take place (1 = Very Unlikely, 5 = Very Likely)

<b>Situation</b>	<b>Mean Likelihood</b>	<b>St. dev.</b>
A 25 percent increase in property taxes increases the cost of owning forestland.(n = 313)	3.05	1.36
The neighboring landowners on <u>all</u> sides of your property decide to subdivide their land and their forest therefore is converted to residential development.(n = 309)	2.79	1.46
The possibility of stricter county zoning regulations threatens to prohibit development efforts in the rural area at some point in the future.(n = 315)	2.57	1.53
The neighboring landowners on <u>one</u> side of your property decide to subdivide their land and their forest therefore is converted to residential development.(n = 311)	2.37	1.31
Your neighboring landowners decide to harvest timber intensively resulting in clearcut areas neighboring your land.(n = 308)	2.17	1.22
Nothing changes in terms of the surrounding area, but someone offers to purchase your forestland for \$20,000 an acre.(n = 317)	2.14	1.42
Increased state forest practice regulations make timber production more prohibitive and more costly.(n = 307)	2.07	1.42
Nothing changes in terms of the surrounding area, but someone offers to purchase your forestland for \$10,000 an acre. (n = 313)	1.54	1.06

With the exception of "a 25 percent increase in property taxes," all of the mean responses fell below the scale midpoint of 3, indicating that landowners are not likely to sell their forestland.

Factor analysis resulted in the responses grouping into two underlying reasons that would cause people to sell or subdivide their land: 1) financial reasons and 2) reasons relating to the quality of the surrounding area (Table 17).

Table 17: Reasons for selling or subdividing: Rotated Factor Matrix (Bold values indicate the reasons that were maintained for each factor)

<b>Reason</b>	<b>Factor 1 - Financial Reasons</b>	<b>Factor 2 - Reasons related to the Quality of the Surrounding Area</b>
Nothing changes in terms of the surrounding area, but someone offers to purchase your forestland for \$20,000 an acre.	<b>.783</b>	.159
Increased state forest practice regulations make timber production more prohibitive and more costly.	<b>.690</b>	.161
The possibility of stricter county zoning regulations threatens to prohibit development efforts in the rural area at some point in the future.	<b>.667</b>	.112
Nothing changes in terms of the surrounding area, but someone offers to purchase your forestland for \$10,000 an acre.	<b>.645</b>	.188
A 25 percent increase in property taxes increases the cost of owning forestland.	<b>.515</b>	.302
The neighboring landowners on <u>all</u> sides of your property decide to subdivide their land and there forest therefore is converted to residential development.	.143	<b>.893</b>
The neighboring landowners on <u>one</u> side of your property decide to subdivide their land and there forest therefore is converted to residential development.	.295	<b>.887</b>
Your neighboring landowners decide to harvest timber intensively resulting in clearcut areas neighboring your land.	.169	<b>.631</b>

Extraction Method: Principle Axis Factoring  
Rotation Method: Varimax with Kaiser Normalization

Table 18 shows the  $\alpha$ s for each factor and the average of the means of the questions that made up the factor.

Table 18:  $\alpha$ s, means and standard deviations for each of the factors derived from the factor analysis of reasons for selling or subdividing forestland

<b>Factor</b>	<b><math>\alpha</math></b>	<b>Average Mean</b>	<b>Average St. Dev.</b>
Financial reasons	.81	2.26	1.03
Reasons related to the quality of the surrounding area	.85	2.43	1.17

The high  $\alpha$ s suggest that both factors are internally reliable and represent the underlying reasons that cause owners to sell or subdivide their land. The similar means for the two factors indicate that owners are about equally likely to sell or subdivide for either reason.

*Owner intentions to enter a cooperative effort.* To examine how likely respondents would be to cooperate, the survey included a series of nine questions defining nine different situations. Again, the possible responses ranged from 1 (Very unlikely) to 5 (Very likely) (Table 19).

Table 19: Likelihood of respondents entering a cooperative effort (1 = Very Unlikely, 5= Very Likely)

<b>Situation</b>	<b>Mean Rating</b>	<b>St. dev.</b>
Before agreeing to sell my land to a developer, I would contact neighboring landowners and discuss with them possibilities for protecting my land from development.(n = 306)	2.73	1.36
I would enter into a contractual agreement with neighboring landowners that prohibits development on all of our properties in order to preserve the rural forested environment.(n = 311)	2.65	1.41
I would informally participate in and share the costs of occasional projects. There would be no written agreements or contractual arrangements. (n = 305)	2.54	1.17
I would share the cost of hiring a wildlife biologist to recommend forest improvements to enhance wildlife habitat across all of the ownerships.(n = 309)	2.44	1.22
I would not cooperate with my neighbors on any land management projects.(n = 306)	2.23*	1.09
I would share the costs of writing a forest management plan for the combined area if such a project would be subsidized by the government.(n = 309)	2.19	1.11
I would share the cost of hiring a logger to selectively remove some timber from all of our land on a one-time basis. The joint effort would reduce costs for all participants.(n = 312)	2.10	1.12
I would share the cost of creating a more extensive trail system for use by cooperating landowners only.(n = 311)	2.07	1.14
I would enter into a contractual agreement with neighboring landowners for a fixed period of time (e.g., 5-10 years) to hire a consulting forester to write and carry out a management plan for the combined land area.(n = 312)	1.88	.93

\*This value is the result of converting the original value of 1.77 to a positive equivalent.

The low means indicate that landowners in general are not interested in cooperating to achieve any of the goals defined.

Factor analysis grouped these situations into two factors representing the underlying reasons that people may be interested in entering cooperative efforts: 1) to manage forestland and 2) to preserve forestland (Table 20).

Table 20: Reasons for cooperating: Rotated Factor Matrix (Bold values indicate the reasons that were maintained for each factor)

<b>Cooperative Effort</b>	<b>Factor 1 - Management</b>	<b>Factor 2 - Preservation</b>
I would enter into a contractual agreement with neighboring landowners for a fixed period of time (e.g., 5-10 years) to hire a consulting forester to write and carry out a management plan for the combined land area.	<b>.751</b>	.258
I would share the costs of writing a forest management plan for the combined area if such a project would be subsidized by the government.	<b>.705</b>	.297
I would share the cost of creating a more extensive trail system for use by cooperating landowners only.	<b>.688</b>	.259
I would share the cost of hiring a wildlife biologist to recommend forest improvements to enhance wildlife habitat across all of the ownerships.	<b>.684</b>	.358
I would informally participate in and share the costs of occasional projects. There would be no written agreements or contractual arrangements.	<b>.480</b>	.257
I would share the cost of hiring a logger to selectively remove some timber from all of our land on a one-time basis. The joint effort would reduce costs for all participants.	<b>.408</b>	.072
I would enter into a contractual agreement with neighboring landowners that prohibits development on all of our properties in order to preserve the rural forested environment.	.183	<b>.817</b>
Before agreeing to sell my land to a developer, I would contact neighboring landowners and discuss with them possibilities for protecting my land from development.	.260	<b>.539</b>
I would not cooperate with my neighbors on any land management projects.	.132	.316

Extraction Method: Principle Axis Factoring

Rotation Method: Varimax with Kaiser Normalization

The relatively high  $\alpha$ s for the two factors (Table 21) suggest that these owners perceive a difference between cooperating to manage the land as opposed to cooperating to preserve it. A comparison of the average means suggests that the owners are more likely to cooperate in order to preserve the land.

Table 21:  $\alpha$ s, means and standard deviations for each of the factors derived from the factor analysis of reasons for entering cooperative efforts

<b>Factor</b>	<b><math>\alpha</math></b>	<b>Average Mean</b>	<b>Average St. Dev.</b>
Preserve forestland	.67	2.68	1.20
Manage forestland	.82	2.21	.81

### *Involvement in cooperative efforts*

Five additional questions addressed the issue of cooperative efforts. When respondents were asked whether or not they know any of the owners of forestland adjacent to theirs and whether or not they had discussed issues related to their properties or worked together on projects affecting both properties, 81 percent (n=321) responded that they did know their neighbors, and 51 percent (n=315) had discussed their properties or worked together on joint projects.

When asked if their decision to sell or donate a conservation easement would be impacted by a neighbor's decision (n = 316), 24 percent of the respondents said they would be more interested in placing a conservation easement on their property if their neighbor agreed to do the same. Sixteen percent said they would be less interested, and 60 percent said their neighbor's decision would have no impact on their own decision.

Responses about owners' current involvement in three types of cooperative efforts (n=322) showed 30 percent were members of a homeowners association, 6 percent were involved in a food coop, and 0.3 percent participated in a babysitting coop. 11 percent were involved in some other form of cooperative effort.

To examine what sort of organizations might best serve as the lead in a cooperative effort, respondents were asked if they would be interested in participating if the effort was initiated by any of five different types of groups (Table 22).

Table 22: Interest in various forms of leadership for cooperative efforts (n = 320)

<b>Leader</b>	<b># interested</b>	<b>Percent interested</b>
A representative of a government natural resource agency	112	35
A neighboring landowner	131	41
A consulting forester	81	25
A forest products company	29	9
A non-profit organization such as the Seattle-King County Land Trust	139	43

### *Demographic characteristics*

Age was coded into six categories (Table 23). The mean age of the respondents was between 50 and 59 years with over one-half of the respondents between the ages of 40 and 59.

Table 23: Respondents' age distribution by 10 yr. classes  
(n=319)

Age class	Frequency	Percent
Under 30	2	.6
30-39	38	11.9
40-49	87	27.3
50-59	76	23.8
60-69	52	16.3
Over 70	64	20.1

Education levels were coded into seven categories (Table 24). Sixty-seven percent of the respondents had achieved at least a 4-year college degree.

Table 24: Respondents' education level distribution  
(n=314).

Level of education	Frequency	Percent
Never attended school	0	0
Elementary school	2	.6
Vocational certificate	2	.6
High school diploma	59	18.8
2-year college degree	45	14.3
4-year college degree	119	37.9
Graduate level degree	87	27.7

Annual household income was coded into 8 categories (Table 25), and the mean income fell within the range of \$60,000 to \$99,999 per year.

Table 25: Respondents' annual household income (n=283)

Annual income	Frequency	Percent
Under \$20,000	11	3.9
\$20,000-\$39,999	42	14.8
\$40,000-\$59,999	47	16.6
\$60,000-\$99,999	72	25.4
\$100,000-\$149,999	56	19.8
\$150,000-\$199,999	26	9.2
\$200,000-\$249,999	8	2.8
\$250,000 or more	21	7.4

Finally, respondents were asked to estimate the percentage of their total assets invested in their forestland. The mean response was 30 percent. Table 26 shows the distribution after the responses were coded into six categories.

Table 26: Percentage of total assets invested in forestland (n=250).

Percent of assets	Frequency	Percent
Less than 10 %	29	11.6
10 % - 25 %	96	38.4
25 % - 50 %	65	26
50 % - 75 %	36	14.4
75 % - 90 %	16	6.4
90 % - 100 %	8	3.2

#### *Traditional owners and "new" owners*

Rank correlation between the number of years that an owner had owned land and the amount of land that s/he owned resulted in a significant correlation with a coefficient of .303 ( $p < .01$ ) indicating that those who had bought their land more recently tended to own less land. The correlation between the number of years that an owner had owned land and the owners' annual income was also significant ( $p < .01$ ) with a coefficient of -.287. Finally, cross-tabulation of the number of years that an owner had owned land (coded into eleven categories based on a five-year interval) and whether or not the owner had previously sold timber from the land indicated that newer owners are significantly less likely to have sold timber. The Chi-square test indicated that the relationship is significant at the .001 level.

Analysis of each of these relationships using bar graphs showed a gradual transition period for each relationship occurring roughly twenty years ago. Acreage distribution shifted toward a predominance of small ownerships at that time, and income distribution shifted toward a predominance of wealthier owners. A shift away from timber sale also occurred during that period. The concurrence of these transitions suggests that King County's urban/rural interface is comprised of two cohorts, just as the literature suggests. The traditional owners have owned their land for twenty years or more, typically own larger parcels, are less wealthy and are more likely to have produced timber on their land. The "new" owners have owned their land for less than twenty years, own smaller parcels, are comparatively wealthy, and likely do not manage their land for the production of timber.<sup>6</sup> In the regression analyses that follow, this cohort was used as

<sup>6</sup> Cross-tabulation was also used to compare the number of years that an owner had owned land with whether or not the owner lives on the land. This relationship did not prove to be significant. However, the lack of significance can probably be attributed to the fact that many of the owners (26 percent) have bought their land in the last five years and may not have yet built on their land, though they intend to do so. This presumption is supported by the fact that 21 percent of respondents indicated that they plan to build a house on their land in the next ten years.

a dichotomous variable to test whether "new" owners are more or less inclined to sell or subdivide their land or enter into cooperative efforts than are traditional owners.

### **Factors that Relate to Landowner Decision-making**

Four regression analyses identified factors that significantly relate to 1) a landowner selling or subdividing her/his land primarily for financial reasons, 2) a landowner selling or subdividing her/his land primarily for reasons related to the quality of the surrounding area, 3) a landowner participating in a cooperative effort to preserve forestland, and 4) a landowner participating in a cooperative effort to manage forestland. The dependent variables in the regressions were extracted using factor analysis from responses to questions about intentions (Tables 18 and 21). As indicated in the discussion of attitude/behavior research, these variables represent the intentions of the respondents, which, in the aggregate, are reliable indicators of behaviors.

The regression analyses were not conducted for the purpose of testing hypotheses or making predictions as to the behavior of an individual landowner. Therefore, with few exceptions,<sup>7</sup> explanatory variables were included in the regressions as independent variables if there was a logical reason that they might have a linear relationship with the dependent variable, and no attempt was made to include interaction terms or alter the functional form of any of the independent variables. Therefore, some caution is necessary in interpreting regression coefficients, particularly where two or more explanatory variables may be correlated, in which case multicollinearity is a concern. However, the regressions were analyzed using collinearity tolerance diagnostics (Bryman et al. 1997), and all of the independent variables were judged to be tolerant of multicollinearity.

The regressions were analyzed based on the value of the adjusted R squared as an indicator of the overall fit of the model. For each explanatory variable, the standardized beta coefficient and the significance level were evaluated as a measure of the relative importance of the variable in explaining the outcome of the dependent variable. The standardized beta coefficient was used because the measurement units differed among the many explanatory variables.

#### *Selling or subdividing forestland for financial reasons*

Twenty explanatory variables were included in a regression exploring what factors relate to the probability of an owner selling her/his land for financial reasons (Table 27). The adjusted R-squared was .344 indicating that the overall fit of the model was quite good. Of the twenty variables, eight were significant at the .05 confidence level.

---

<sup>7</sup> In order to avoid complications caused by a potentially dominant variable, the "real estate investment" factor was not used in the regression that explains factors that might cause a landowner to sell/subdivide for financial reasons.

Table 27: Explanatory variables related to the likelihood of a landowner selling or subdividing forestland for financial reasons (bold print indicates statistically significant variables).

<b>Variable</b>	<b>Standardized B</b>	<b>Sig.</b>
Constant		.000
<i>Owner characteristics</i>		
Age	.051	.366
Children	-.040	.403
<b>Education level</b>	<b>-.118</b>	<b>.019</b>
<b>Income</b>	<b>-.139</b>	<b>.014</b>
<b>Percent of assets invested in forestland</b>	<b>-.121</b>	<b>.024</b>
Urban residency	.051	.394
<i>Forestland factors</i>		
Acres owned	-.088	.080
<b>Number of different locations owned</b>	<b>.156</b>	<b>.003</b>
"New" owner	.019	.729
<b>Residency on land</b>	<b>-.213</b>	<b>.000</b>
Enrollment in Current Use Taxation	-.075	.192
Completed forest management plan	.071	.224
<i>Landowner values and objectives</i>		
Natural and aesthetic qualities	-.031	.587
Commodity and recreational use	.014	.781
<b>Attitude toward the role of forestland in the larger landscape</b>	<b>-.243</b>	<b>.000</b>
<b>Interest in timber sale</b>	<b>.210</b>	<b>.000</b>
<b>Previous sale or subdivision</b>	<b>.110</b>	<b>.026</b>
Interest in conservation easement	-.007	.892

Dependent variable: "Financial reasons" factor

N=328

Adjusted R-squared = .344

SE = .7993

#### *Selling or subdividing forestland for reasons related to the quality of the surrounding area*

Twenty-one variables were included in a regression examining what factors relate to the likelihood of an owner selling her/his land for reasons related to the quality of the surrounding area (Table 28). The overall fit of this model was not very good (R-squared = .105), but six variables were significant at the .05 confidence level.

Table 28: Explanatory variables related to the likelihood of a landowner selling or subdividing forestland for reasons related to the quality of the surrounding area (bold print indicates statistically significant variables).

<b>Variable</b>	<b>Standardized B</b>	<b>Sig.</b>
Constant		.001
<i>Owner characteristics</i>		
Age	-.055	.414
<b>Children</b>	<b>-.138</b>	<b>.015</b>
Education level	-.005	.932
Income	-.042	.524
<b>Percent of assets invested in forestland</b>	<b>-.208</b>	<b>.001</b>
<b>Urban residency</b>	<b>.137</b>	<b>.049</b>
<i>Forestland factors</i>		
Acres owned	-.108	.070
Number of different locations owned	.027	.661
"New" owner	.080	.203
Residency on land	.099	.163
<b>Enrollment in Current Use Taxation</b>	<b>-.149</b>	<b>.027</b>
Completed forest management plan	.071	.300
<i>Landowner values and objectives</i>		
<b>Real estate investment</b>	<b>.204</b>	<b>.002</b>
Natural and aesthetic qualities	.025	.713
Commodity and recreational use	.043	.476
Attitude toward the role of forestland in the larger landscape	-.075	.247
<b>Interest in timber sale</b>	<b>.141</b>	<b>.027</b>
Previous sale or subdivision	-.042	.473
Interest in conservation easement	.013	.823

Dependent variable: "Reasons related to the quality of the surrounding area" factor

N=328

Adjusted R-squared = .105

SE = 1.0622

### *Cooperating to preserve forestland*

Twenty-four explanatory variables were included in the regression examining what factors relate to the likelihood of an owner cooperating for the purpose of preserving forestland (Table 29). The R-squared for this regression was .253. Seven explanatory variables were significant at the .05 confidence level.

Table 29: Explanatory variables related to the likelihood of a landowner cooperating to preserve forestland (bold print indicates statistically significant variables).

<b>Variable</b>	<b>Standardized B</b>	<b>Sig.</b>
Constant		.024
<i>Owner characteristics</i>		
Age	-.016	.797
Children	-.008	.882
Education level	-.008	.887
Income	.077	.196
Percent of assets invested in forestland	.015	.791
Urban residency	.001	.993
<i>Forestland factors</i>		
Acres owned	-.029	.599
Number of different locations owned	-.018	.752
"New owners"	-.022	.699
Residency on land	-.030	.647
Enrollment in Current Use Taxation	.057	.356
<b>Completed forest management plan</b>	<b>-.142</b>	<b>.025</b>
<i>Landowner values and objectives</i>		
<b>Real estate investment</b>	<b>-.263</b>	<b>.000</b>
Natural and aesthetic qualities	.056	.362
Commodity and recreational use	.043	.439
<b>Attitude toward the role of forestland in the larger landscape</b>	<b>.145</b>	<b>.016</b>
Interest in timber sale	.043	.457
<b>Previous sale or subdivision</b>	<b>-.156</b>	<b>.005</b>
<b>Interest in conservation easement</b>	<b>.112</b>	<b>.037</b>
<b>Previous cooperative efforts</b>	<b>.147</b>	<b>.007</b>
Relationship with neighbors	-.052	.381
<b>Previous work with neighbor</b>	<b>.142</b>	<b>.020</b>

Dependent variable: "Forestland preservation" factor

N=328

Adjusted R-squared = .253

SE = .9973

### *Cooperating to manage forestland*

Twenty-four explanatory variables were included in the regression exploring what factors relate to the likelihood of an owner cooperating for the purpose of managing

forestland. The R-squared for this regression was .204. Five explanatory variables were significant at the .05 confidence level (Table 30).

Table 30: Explanatory variables related to the probability of a landowner cooperating to manage forestland (bold print indicates statistically significant variables).

<b>Variable</b>	<b>Standardized B</b>	<b>Sig.</b>
Constant		.060
<i>Owner characteristics</i>		
Age	-.100	.117
Children	-.044	.405
Education level	.046	.414
<b>Income</b>	<b>.125</b>	<b>.044</b>
Percent of assets invested in forestland	-.046	.438
Urban residency	.011	.869
<i>Forestland factors</i>		
Acres owned	-.045	.429
Number of different locations owned	.034	.567
"New owner"	-.005	.940
Residency on land	-.072	.293
Enrollment in Current Use Taxation	.029	.654
Completed forest management plan	-.053	.419
<i>Landowner values and objectives</i>		
<b>Real estate investment</b>	<b>-.129</b>	<b>.044</b>
Natural and aesthetic qualities	-.011	.867
Commodity and recreational use	.091	.113
<b>Attitude toward the role of forestland in the larger landscape</b>	<b>.214</b>	<b>.001</b>
<b>Interest in timber sale</b>	<b>.126</b>	<b>.038</b>
Previous conversion	-.089	.115
Interest in conservation easement	.073	.186
<b>Previous cooperative efforts</b>	<b>.224</b>	<b>.000</b>
Relationship with neighbors	-.044	.472
Previous work with neighbor	.041	.509

Dependent variable: "Forestland management" factor

N=328

Adjusted R-squared = .201

SE = .6938

## CHAPTER 7: DISCUSSION

This chapter explains the substantively significant results presented in Chapter 6 and compares the findings of this study to the existing research on the urban/rural interface and cooperative land management. The chapter is divided into three sections: 1) a description of the population at King County's urban/rural interface and the landowners' values and objectives toward the management of their forestland, 2) a discussion of the likelihood of landowners selling or subdividing their land, and 3) a discussion of the feasibility of cooperative efforts.

### **The Population at the Urban/Rural Interface**

The area of King County's urban/rural interface analyzed in this study is fairly characteristic of interface areas throughout the country. Much of the land has already been fragmented into small lots. A large number of the owners (69 percent) have bought their land in the last twenty years, and the majority of the landowners live on their land.

The trend at King County's urban/rural interface involves the purchase of forested tracts by "new" owners with a desire to live in a rural, forested environment. The majority of these landowners are upper middle class people who own less than twenty acres and have little or no intention of managing it for the production of forest products.

Findings regarding the respondents' objectives as forest landowners and the values they place on forestland support the many other studies assessing the objectives of private forest owners throughout the country. These studies have found that the production of timber is of secondary importance to the natural and aesthetic qualities of the land (Bliss 1997, Birch 1994, Brunson 1996, Sample et al. 1995). Less than one-third of the respondents had ever sold timber from their land, and only 17 percent of those that had not done so expressed an interest in doing so in the future. When asked to rate the importance of "income from timber production" as a reason for owning their land, only 18 percent responded that it was "important" or "very important." Fifty-two percent indicated that timber production was of little importance.

The assessment of management objectives supports the finding that the production of forest products is of secondary importance to other uses of the land. As noted previously, factor analysis yielded three factors representing reasons for owning land: 1) natural and aesthetic qualities, 2) real estate investment, and 3) commodity and recreational use. The mean scores for the factors indicate that natural and aesthetic qualities (mean = 4.04) are significantly more important ( $p < .05$ ) than either real estate investment (mean = 2.46) or commodity and recreational use (mean = 1.92).

Within the real estate investment factor, landowners rated "investment opportunity from resale of land" as being somewhat important (mean = 3.07). However, they rated "eventual commercial development or subdivision" as being of little importance (mean = 1.89). These results suggest that while landowners do consider the resale value of their land to be important, the majority do not own the land for speculative

reasons and are not necessarily seeking to realize its full economic potential, although this response may be due to the fact that many of the owners are not in a position to subdivide, given the current zoning status of their land.

The low mean score for the commodity and recreational use factor results from low mean scores for responses to each of the five reasons that grouped into this factor, suggesting that neither recreational use nor the production of timber or non-timber products are high priorities. The low level of importance given to "non-motorized recreational use" is somewhat surprising, as non-motorized recreation is often associated with an appreciation of the natural and aesthetic qualities of the forestland. The majority of owners may not own enough land to consider it a place to recreate in this manner, or perhaps they did not understand the meaning of "non-motorized recreation" and did not associate it with passive activities such as hiking, bird watching, horseback-riding, etc. The survey was not clear in this regard.

Responses to the question regarding the owners' plans for their land in the next ten years support the above finding that financial gain is not a high priority among these owners. Only 17 percent responded that they will subdivide or sell the land when economic conditions are optimal. Only 9 percent responded that they intend to manage the land as a working forest, reinforcing the conclusion that income from timber harvest is not an important reason for owning land.

The fact that 44 percent of the respondents had either sold or donated a conservation easement or expressed an interest in doing so supports the finding that natural and aesthetic qualities are of primary importance to the majority of these owners.

Finally, the fact that only 27 percent of the owners had enrolled their land in a county tax program, and only 22 percent had completed a management plan for their land may suggest two factors; 1) that many of the owners are not aware of the tax incentive, or 2) that many of the owners do not consider themselves "forest landowners." This second factor is quite possible given that many of the respondents are "new" owners that have bought their land as a place to live away from the city and may not be aware of the potential value of the land as forest, and especially as a source of forest products.

### **Likelihood of Selling or Subdividing Forestland**

As previously discussed, factor analysis of eight questions concerning why an owner might sell or subdivide forestland resulted in two factors: 1) financial reasons and 2) reasons related to the quality of the surrounding area. The low mean scores for both factors (2.26 and 2.43 respectively) suggest that most respondents are not planning to sell or subdivide their land for either reason, and that degradation of the surrounding area, in the form of either development or clearcutting, is as likely to cause them to do so as are financial concerns.

The reason most selected for selling or subdividing forestland (mean = 3.1) was a 25 percent increase in property taxes. This result suggests that while most owners don't plan to make money from conversion, many are concerned that they may not be able to

afford to keep the land in forest and could be forced to convert it if taxes make ownership too costly.

The second most likely reason for possible selling or subdividing of forestland was if neighboring landowners on all sides of the respondent's property converted their land to residential development (mean = 2.8). This result supports the above finding that the natural and aesthetic qualities of the land are the most important reasons for owning forestland. If the surrounding area is overly impacted, these qualities disappear and landowners have less desire to hold onto their land.

Another interesting finding from this question results from comparing the possibilities of landowners being offered \$10,000 or \$20,000 per acre for their land. The mean scores for these two situations are 1.5 and 2.1 respectively, suggesting that, although respondents are not likely to sell their land for financial reasons, they probably will respond to the market, and if the value of their land increases substantially, they may sell.

#### *Factors impacting owner decisions to sell or subdivide forestland*

An analysis of the factors that do and do not significantly impact landowner decisions to sell or subdivide their forestland presents some interesting results pertaining to research on the urban/rural fringe. Notably, there is no significant difference between traditional forest owners and "new" landowners regarding the likelihood of selling or subdividing land. The differences between these two groups, suggested in the literature and in the demographic data of this study, are not manifested in the owners' intentions for the future sale or subdivision of their forestland.

Owners who live on their land are significantly less likely to sell or subdivide their land for financial reasons than are absentee owners. This finding suggests that owners living on their land have bought the land as a place to live rather than as an investment. The trend toward residential use of the land may therefore indicate an accompanying trend toward more stable ownership patterns, as landowners buying the land to live on will be more likely to hold onto it. This trend may also hold some promise for better forest stewardship, as suggested by Martin's (1998) theory that owners who live on their land are likely to be better stewards.

Not surprisingly, the likelihood of selling or subdividing increases with the number of locations owned. Respondents that own forestland in more than one location have probably bought their land as an investment rather than as a place to live and may be eager to sell or subdivide it for financial gain. Interestingly, the amount of land owned did not have a significant relationship with the likelihood of selling or subdividing. It would seem that owners with large amounts of land are more able to insulate themselves from the surrounding area and would be less likely to sell or subdivide if the area were degraded. However, this was not the case. Collinearity between the amount of land owned and the number of locations owned may be affecting the regressions.

Among reasons for owning land, only an interest in timber production and the real estate investment factor were significant indicators of the likelihood of selling or

subdividing. Interest in timber production increased the reported likelihood of selling or subdividing forestland for both financial reasons and reasons related to the quality of the surrounding area. This pattern suggests that, for many owners, an interest in timber production may be associated with a general desire to profit from the land rather than a desire to maintain it as a working forest.

The relationship between the real estate investment factor and an intention to sell or subdivide makes obvious sense in that landowners who stated that investment opportunity or eventual development are high priorities are likely to sell or subdivide their forestland no matter what the situation might be. However, those who gave high importance to natural and aesthetic qualities or commodity and recreational use were not significantly less likely to indicate an intention to sell or subdivide than those for whom these objectives were not high priorities. It would seem that those with a high degree of appreciation for natural and aesthetic qualities would be more likely to indicate an intention to sell or subdivide if the surrounding area were degraded by development or clearcutting. However, this was not the case.

Owners who agreed or strongly agreed that the condition of their forestland has an impact on the larger landscape were significantly less associated with an intention to sell or subdivide their forestland for financial reasons. This finding indicates that for many owners environmental values and an understanding of the ecological importance of forestland may outweigh financial gain in their decisions of whether or not to sell or subdivide their forestland. This result suggests that education about the value of maintaining forestland may help preserve forestland in King County.

Owners enrolled in the county's current use taxation (CUT) programs indicated significantly less interest in selling or subdividing their forestland than those who were not enrolled in CUT. This finding may suggest that owners enroll in CUT in part because of concern for the preservation of the land. However, the fact that enrollment is significant only in the regression on reasons related to the quality of the surrounding area suggests that people enroll in CUT for a variety of reasons. Some do so because they have an interest in preserving the land while others may be more concerned with the financial benefit of the tax break. These reasons may counterbalance each other in terms of selling or subdividing for financial reasons, which would explain why CUT was not a significant factor in the regression on financial reasons for selling or subdividing.

Finally, having a forest management plan, regardless of the management objective, did not have a significant impact on intention to sell or subdivide. This result may be somewhat disappointing given that many of the County's technical assistance efforts are aimed at helping owners create management plans with the assumption that doing so will generate interest in preserving the forest and will inhibit conversion.

### **Likelihood of Cooperating**

The majority of the respondents indicated little interest in cooperative efforts. However, they are significantly more likely ( $p < .01$ ) to cooperate to preserve land (mean = 2.68) than to manage it for timber, recreation, or wildlife (mean = 2.21). This lack of

interest in cooperative efforts may be due to the importance that the landowners give to "the privacy associated with a rural quality of life." Eighty-six percent rated this reason for owning forestland as important or very important. Cooperative efforts may be considered contrary to this desired privacy, which respondents seem to consider more important than financial gain, forest health or forest preservation.

The lack of interest in cooperative efforts may also result from a lack of understanding of the potential benefits of cooperating. The survey made no effort to educate landowners on these benefits, and therefore cooperative efforts could be seen as requiring substantial effort with minimal rewards.

Also, the traditional owners and the "new" owners may be wary of each other due to their social differences and different management objectives, as suggested in the literature and in the data from this study. These differences, which have been a source of conflict over land-use regulations, may result in misunderstanding of each other's motivations. Forest owners are likely to be skeptical of cooperative efforts as long as misunderstandings exist.

A final explanation may be lack of time (Washburn 1996, Williams 1997). High annual household incomes suggest that many of the "new" owners are probably working full-time jobs not related to their forestland. These jobs, and the associated commute that many of the jobs involve, may occupy enough time that they are not eager to commit themselves to cooperative efforts that will take additional time.

Given the high score that respondents gave to natural and aesthetic qualities (mean = 4.04) as opposed to commodity and recreational use (mean = 1.92), it is not surprising that they were more likely to cooperate to preserve the land than to manage it for timber or recreation. It may also be the case that many of the "new" owners do not understand the benefits of actively managing the land for ecological purposes and assume that the best way to preserve it is to leave it alone.

With regard to cooperating to manage the land, the highest score for an individual question was in response to "I would informally participate in and share the cost of occasional projects. There would be no written agreements or contractual arrangements" (mean = 2.5). The lowest score was for "I would enter into a contractual agreement with neighboring landowners for a fixed period of time (e.g., 5-10 years) to hire a consulting forester to write and carry out a management plan for the combined area" (mean = 1.9). These two questions were the only ones related to cooperatively managing forestland that mentioned contractual agreements. These results support the literature that rural landowners are usually somewhat wary of contractual agreements and are more likely to cooperate in casual arrangements (Rickenbach 1998, Sample 1994, Williams 1997).

Given the general lack of interest in cooperative efforts, it is not surprising how owners responded when asked if their decision to sell or donate a conservation easement would be impacted by their neighbors' decision. Sixty percent said their neighbors' decision would have no impact on their own decision. However, this response is somewhat inconsistent with respondents selecting conversion of the surrounding area to residential development as the second most important reason that would cause them to sell or subdivide their land. With this being the case, one would expect respondents to be more responsive to their neighbors' willingness to preserve their land through a

conservation easement. This inconsistency is reiterated in an analysis of the responses to the question regarding the initiator of a cooperative effort. Forty-one percent responded that they would be interested if the effort was initiated by a neighboring landowner. This was the second highest percentage after a non-profit organization (43 percent).

*Factors impacting owner decisions to enter into cooperative efforts*

The decision to enter into cooperative efforts does not relate significantly to demographic traits or land ownership patterns. Rather, the decision is affected by owner values and objectives and previous involvement with cooperative efforts.

Neither the amount of land owned nor whether or not a landowner lives on the land were significant indicators of a willingness to cooperate either to preserve or manage the land. This finding is particularly surprising with regard to residency on the land, as one would presume that owners living on their land would be more interested in cooperating to preserve it. It may be that the desire to preserve the land is offset by a desire for independence and solitude that might inhibit cooperative efforts.

It is surprising too that small landowners are not more interested in cooperative efforts than large landowners. It would seem that small landowners are less able to insulate themselves from their surroundings and would be more interested in cooperating to preserve those surroundings or create the economies of scale necessary to productively manage working forests. However, this was not the case.

As was the case with an interest in selling or subdividing forestland, real estate investment as a reason for owning land and an interest in timber production are both related to an interest in cooperation. Real estate investment as an important landowner objective decreases the likelihood of a landowner entering a cooperative effort. Landowners who have bought their land as an investment with the intention of eventually selling it or subdividing it would logically not be interested in cooperative efforts which take time and energy to develop. If they are not going to hold onto the land, they have no reason to cooperatively manage it or preserve it.

An interest in selling timber increases the likelihood of a landowner entering a cooperative effort to manage forestland, but not to preserve it. This may suggest that the financial benefits of cooperative management efforts, which are derived primarily through timber production, are the driving force behind a willingness to cooperatively manage land.

It is somewhat surprising that landowners who place a high degree of importance on natural and aesthetic values or on recreational and commodity values are not significantly more interested in cooperating to manage for those values or to preserve the land in order to maintain them. It may be that many owners do not understand the benefits of cooperating to achieve these goals. If this is the case, educational outreach emphasizing the benefits of cooperation may facilitate future efforts. The potential importance of educational outreach is emphasized by the fact that landowners who have an understanding of the role of their forestland as part of the larger landscape are significantly more likely to enter cooperative efforts.

Landowners who have participated in other types of cooperative efforts, the most common being homeowner associations, are more likely to enter cooperative efforts to preserve or manage their forestland. This is probably due to an understanding of how cooperative efforts work and can benefit those involved. This result is encouraging and suggests that cooperative efforts may be feasible once landowners have a better understanding as to what is involved. The fact that landowners who have previously worked with their neighbors on property related projects are more interested in cooperating to preserve the land supports this conclusion. However, these relationships may also be attributed to the fact that people who have cooperated in the past have a personality that fosters cooperation. These people would naturally be more likely to cooperate again in the future.

## CHAPTER 8: POLICY RECOMMENDATIONS

The following recommendations are based on the results of this research and offered to planners at King County who are working to preserve the forest land base at the urban/rural interface.

- Landowner concern over increased property taxes suggests that the County should continue to market the current use taxation programs. Owners enrolled in these programs are significantly less likely to sell or subdivide their forestland. The fact that only twenty-eight percent of the respondents are enrolled in CUT suggests that many people are not aware of the potential benefit. The County needs to improve the marketing of the programs in an effort to make landowners aware of the opportunity. While these programs do not guarantee permanent preservation, they will slow the conversion process while the County develops other programs or raises the funds to buy lands or development rights.
- The relatively high level of interest in conservation easements should lead the County to pursue funding sources that enable the purchase of development rights from landowners. When pursuing the purchase of development rights, the County may want to form partnerships with local land trusts or non-profit conservation groups, as many of these forest owners may be more willing to work with a non-profit to preserve their land.
- Negative changes to the surrounding area are just as likely as financial reasons to cause these landowners to sell or subdivide their land. Given this result, stricter zoning regulations, while always somewhat controversial, may be acceptable with these landowners. If the County hopes to purchase development rights, it may be necessary to first provide some regulatory certainty that the surrounding area will not be densely developed. If lower density zoning is not implemented, the County at least needs to assure that the current regulations will be upheld in the future.
- The County should focus its efforts on landowners who are actively harvesting timber or expressing a desire to do so, as these owners are significantly more likely to sell or subdivide their land. Owners interested in timber production seem to be financially motivated, and anything the County can do to provide additional income for these owners may forestall conversion. The County might play a facilitative role in the production and sale of timber and other forest products, perhaps subsidizing logging or milling costs, or assisting landowners with the marketing of products. The County should also focus funds for the purchase of development rights on these owners.
- The County should also focus its efforts on owners that own land in more than one location. These owners seem to have bought their land as a real estate investment, as they are significantly more likely than others to sell or subdivide. They may not be

interested in managing the land for forest, in which case fee simple purchase may be necessary. In any case, these lands are highly threatened by conversion, and depending on their value to the County as forestland, they need to be the focus of funds dedicated for land purchases.

- The County should make more of an effort to reach out to owners who do not live on their land, and particularly urban residents. These absentee landowners are significantly more likely to sell or subdivide their forestland. Education that informs owners of the role that their forestland plays in the larger landscape may have a positive effect on these owners' decisions, as many of them may not have much understanding of the ecological importance of their land to the surrounding environment. The County should also educate these owners on the potential income that they might generate through the production of timber.
- The fact that an understanding of the ecological importance of forestland decreases the likelihood of selling or subdividing and increases the likelihood of entering cooperative efforts suggests that the County should continue to provide technical assistance and offer the forestry education programs currently in place. In addition, the County should increase its educational efforts to reach a larger audience, including potential buyers and current owners that have not had contact with the County. A targeted outreach effort might be necessary.
- The promotion of cooperative efforts will be challenging for King County planners. Any such effort will have to begin with educational outreach that emphasizes the benefits to each landowner. The effort should focus on the cooperative preservation of the forest land base with the hope that cooperative management efforts will follow. If management efforts are promoted, the County should target those interested in timber harvest and emphasize the financial benefits of cooperatively managing for timber.
- The fact that landowners involved in other types of cooperative efforts are more likely to cooperate with regard to their forestland suggests that the County should target existing homeowner associations and work with members to expand their cooperative efforts to involve the preservation and/or management of their forestland.
- A successful cooperative effort is most likely to occur if it is initiated by a non-profit organization or one of the landowners involved in the effort. Forest consultants and especially forest product companies are not likely to be well received by these landowners. A County representative may be able to lead the effort, but success will be more likely if s/he works in partnership with a non-profit group or encourages one of the landowners to take the lead. The County's role may be to provide technical support once the effort has been initiated.

- Finally, informal efforts that do not involve contractual obligations are likely to be more successful than those requiring a contractual commitment. The landowners at King County's urban/rural interface need to begin the cooperative process slowly and develop the trust necessary to successfully cooperate before any sort of long-term agreements are made. Whoever initiates the effort should be wary of these concerns and progress gradually.

## CHAPTER 9: CONCLUSION

King County's urban/rural interface presents a complex problem for planners and natural resource managers. The changing population and the associated fragmentation of large ownerships into small residential homesites has resulted in an increasing spectrum of landowner values and objectives that makes planning for the interface a difficult and potentially frustrating task. There are no easy answers, and policy decisions will certainly favor one viewpoint over others. However, if King County leaders are committed to preserving the forest land base, they cannot ignore the problem, and they must act to set policy with this commitment in mind.

Hopefully, this study can provide direction for King County's planners and elected officials as they strive to work with forest landowners at the urban/rural interface to preserve forestland. The recommendations discussed in Chapter 8 are based directly on the results of this research and reflect the responses from a relatively large sample of landowners in this area. Their input should weigh heavily in the decision-making process.

This study did not analyze the objectives and intentions of the industrial forest landowners in and near the Rural Area. Weyerhaeuser and Plum Creek own a large amount of land, and their actions will have a tremendous impact on forest cover in this area. Whatever incentive programs the County adopts to work with the landowners represented in this study will likely not affect these corporations. They are in an entirely different category and respond to different circumstances. The County must approach these corporations independently and work together with the company leaders to arrive at solutions that keep their land forested. The recommendations outlined in this study do not apply to these landowners.

The primary objective of this study was to evaluate the situation at King County's urban/rural interface and provide recommendations for King County planners. As such, the external validity of these results has not been examined. However, as discussed in Chapter 2, the issue of forestland conversion at the urban/rural interface is not unique to King County, and many of the results from this study may well apply to other interface areas throughout the country. Hopefully, this study will stimulate future research efforts that either support or refute these results. In addition, this study raises a number of interesting questions that deserve future analysis in attempts to address the problems of the urban/rural interface and encourage cooperative forestland management.

### **Directions for future research**

Regression analysis was used in this study as a scanning technique to search for relationships that might evolve into formal hypotheses. The factors that proved to be significant indicators of landowner decisions to sell or subdivide their forestland or enter into cooperative efforts need to be tested with other populations using formal hypothesis testing procedures. Of particular interest with regard to the urban/rural interface is

whether or not residency on the land decreases interest in selling or subdividing in other regions.

Additional research is needed to better understand how differences in value systems between traditional forest owners and "new" residential owners are impacting decisions regarding cooperative efforts. This study found no difference between the two groups regarding the likelihood of selling or subdividing forestland or of cooperating, but the literature suggests that social differences may present a barrier to cooperative efforts. Future research should focus on how these social differences, if they exist, are impacting cooperative efforts.

Owners at King County's urban/rural interface were found to understand the importance of their forestland as part of the larger landscape. In addition, most are concerned about the impacts of development on the forest land base. However, the majority were not interested in participating in cooperative efforts to preserve forestland. Additional research is needed to better understand what barriers are deterring landowners from entering cooperative efforts. This study suggests that a desire for privacy and solitude may be one issue. Future research should analyze this possibility to better understand if this is the case, and if so, to determine ways of overcoming such an obstacle to cooperative efforts.

As mentioned, the lack of interest in cooperative efforts may be due to a lack of understanding as to the potential benefits to be derived from cooperating. This possibility suggests that education may play a critical role in the establishment of a cooperative effort. Future research should evaluate the impact of education and improved understanding on a willingness to participate in cooperative land management efforts.

This study did not account for existing zoning regulations and how they might affect landowner decisions to sell or subdivide their land. It would be interesting to know whether landowners who have already developed their land to its full zoned potential are more or less likely to state an intention to sell or subdivide their land. The effects of zoning on forestland conversion are often temporary, and it would be helpful for planners to understand how forest landowners perceive zoning regulations.

Finally, a geographic analysis of landowner values, objectives and intentions would improve understanding of the urban/rural interface. In particular, it would be interesting to know if values, objectives and intentions vary with location, or if distance from an urban center has an effect. Geographic data was collected for this study, and such research may be the next step in attempts to understand the intricacies of the urban/rural interface.

## LIST OF REFERENCES

- Ajzen, Icak and Martin Fishbein. 1980. *Understanding Attitudes and Predicting Social Behavior*. Prentice Hall, Inc., Englewood Cliffs, New Jersey.
- Barton, Alan William. 1989. *A Property Rights Economics Interpretation of the Formation of Landowner-Based Organizations for Non-Industrial Private Forest Owners*. Unpublished thesis. University of Washington. Seattle, WA.
- Bick, S., H. L. Haney Jr., C.D. West and D. F. Dennis. 1997. Voluntary Landowner Participation in Landscape Management Through Conservation Easements. *Proceedings of the Society of American Foresters National Convention*. Bethesda, Maryland. 253-258.
- Birch, Thomas W. 1994. Private forest-land owners of the United States. Resource Bulletin NE 134. USDA Forest Service, Northeastern Forest Experiment Station.
- Bliss, J.C., S. K. Nepal, R. T. Brooks Jr. and M.D. Larsen. 1997. In the mainstream: environmental attitudes of mid-south forest owners. *Southern Journal of Applied Forestry* 21(1):37-43.
- Bradley, Gordon A. (ed.). 1984. *Land Use and Forest Resources in a Changing Environment: The Urban/Forest Interface*. University of Washington Press, Seattle, WA.
- Brunson, Mark W. 1998. Social Dimensions of Boundaries: Balancing Cooperation and Self-Interest. Pages 65-86 in *Stewardship Across Boundaries* (Richard L. Knight and Peter B. Landres, eds.). Island Press, Washington, DC.
- Brunson, Mark W., Deborah T. Yarrow, Scott D. Roberts, David C. Guynn Jr., and Michael R. Kuhns. 1996. Nonindustrial Private Forest Owners and Ecosystem Management: Can they Work Together?. *Journal of Forestry* 94 (6):14-21.
- Bryman, Alan and Duncan Cramer. 1997. *Quantitative Data Analysis with SPSS for Windows: A Guide for Social Scientists*. Routledge, London.
- Campbell, Susan M. and David B. Kittredge. 1996. Ecosystem-based Management on Multiple NIPF Ownerships. *Journal of Forestry* 94 (2):24-29.
- Cliff, E. P. 1968. Forest Service furnishes leadership. *News for Farmer Cooperatives* 35(2):13,17.
- Cortner, Hanna J. 1991. Interface Policy Offers Opportunities and Challenges: USDA Forest Service Strategies and Constraints. *Journal of Forestry* 89 (6): 31-34.

Cromwell, Dean A. 1984. Strategies for Dealing with the Urban/Forest Interface: The Recent California Experience. Pages 151-162 in *Land Use and Forest Resources in a Changing Environment: The Urban/Forest Interface* (Gordon A. Bradley, ed.). University of Washington Press, Seattle, WA.

DeCoster, Lester A. 1998. The Boom in Forest Owners - A Bust for Forestry?. *Journal of Forestry* 96 (5): 25-28.

Dillman, Don. 1978. *Mail and Telephone Surveys: the total design method*. Wiley, New York.

Dobbs, David. 1998. Private Property, Public Good. *Audubon* 100(4):120.

Ewing, R. A. 1981. Public policy for private non-industrial forest ownerships: the professional search for appropriate means of governmental intervention. Berkley, CA: Ph.D. dissertation, University of California.

*Farm and Forest: a Strategy for Preserving the Working Landscapes of Rural King County*. 1996. The Cedar River Associates. Seattle, Washington.

Forman, Richard T. T. 1995. *Land Mosaics: The Ecology of Landscapes and Regions*. Cambridge University Press, Cambridge.

Greenberg, Joshua D. and Gordon A. Bradley. 1997. Analyzing the Urban-Wildland Interface with GIS: Two Case Studies. *Journal of Forestry* 95 (10):18-22.

Healy, Robert G. 1984. Forests in Urban Civilization: Land Use, Land Markets, Ownership, and Recent Trends. Pages 17-35 in *Land Use and Forest Resources in a Changing Environment: The Urban/Forest Interface* (Gordon A. Bradley, ed.). University of Washington Press, Seattle.

Irland, Lloyd C. 1994. Getting from Here to There: Implementing Ecosystem Management on the Ground. *Journal of Forestry* 92 (8):12-17.

Jamnack, M. S. and D. R. Beckett. 1988. A Logit Analysis of Private Woodlot Owner's Harvesting Decisions in New Brunswick. *Canadian Journal of Forest Resources* 18(3):330-336.

*King County Comprehensive Plan: Complete with 1997 Updates*. 1997. King County Department of Development and Environmental Services. King County, Washington.

*King County Rural Forest Program: Forest Monitoring Baseline Report*. King County Department of Natural Resources. Unpublished. April, 1998.

Kittredge, David B. and Mark G. Rickenbach. 1997. The Application of an Ecosystem-Based Management Model to a Landscape Owned by Non-industrial Private Individuals. Pages 299-311 in *Approaches to Extension in Forestry*, Proceedings IUFRO Working Party. Freising, Germany.

Knight, Richard L. and Tim W. Clark. 1998. Boundaries between Public and Private Lands: Defining Obstacles, Finding Solutions. Pages 175-191 in *Stewardship Across Boundaries* (Richard L. Knight and Peter B. Landres, eds.). Island Press, Washington, DC.

Knight, Richard L. and Peter B. Landres (eds.). 1998. *Stewardship Across Boundaries*. Island Press, Washington, DC.

Knox, R. L. 1969. Forest landowners using 143 co-ops. *News for Farmer Cooperatives* 36(3):11, 17-18.

Krishnaswamy, Ajit K. 1997. Forest Land Owners and Managers in two Watersheds on the Olympic Peninsula: A Study in Sustainability. Unpublished dissertation. University of Washington, Seattle, WA.

Landres, Peter B. 1998. Integration: A Beginning for Landscape Scale Stewardship. Pages 337-345 in *Stewardship Across Boundaries* (Richard L. Knight and Peter B. Landres, eds.). Island Press, Washington, DC.

Lee, Robert G. 1984. Implications of Contemporary Community Organization and Social Values for Forest Management on the Residential/Wild Land Interface. Pages 119-132 in *Land Use and Forest Resources in a Changing Environment: The Urban/Forest Interface* (Gordon A. Bradley, ed.). University of Washington Press. Seattle, WA.

Lee, Robert G. 1991. Four Myths of Interface Communities: Rural Localities do not Epitomize Idealized Conceptions. *Journal of Forestry* 89(6):35-38.

MacLean, Colin and Charles Bolsinger. 1997. Urban Expansion in the Forests of the Puget Sound Region. Resource Bulletin PNW-RB-225. United States Department of Agriculture, Forest Service. Pacific Northwest Research Station.

Martin, David. 1998. Homestead Land Tenure: An Option for Better Forestry. *Ecoforestry* 13(2): 26-30.

Matthei, Charles. 1984. Protecting Forestlands. Pages 74-76 in *Land-saving action: a written symposium by 29 experts on private land conservation in the 1980s* (Russell L. Brennemen and Sarah M. Bates, eds.). Island Press, Covelo, CA.

Nachmias, Chava-Frankfort and David Nachmias. 1996. *Research Methods in the Social Sciences (Fifth Edition)*. St. Martin's Press, New York.

Rickenbach, Mark G., David B. Kittredge, Don Dennis and Tom Stevens. 1998. Ecosystem Management: Capturing the Concept for Woodland Owners. *Journal of Forestry* 96(4):18-24.

Sample, V. Alaric. 1995. Building Partnerships across Boundaries and Jurisdictions. *Proceedings of the Society of American Foresters National Convention*. Bethesda, Maryland. 335-338.

Sample, V. Alaric. 1992. Building Partnerships for Ecosystem Management on Forest and Range Lands of Mixed Ownership. *Proceedings of the Society of American Foresters National Convention*. 334-339.

Sample, V. Alaric. 1994. Building Partnerships for Ecosystem Management on Mixed Ownership Landscapes. *Journal of Forestry* 92 (8):41-44.

Sample, V. Alaric. 1996. Planning Forest Management to Protect Water Quality on Mixed Ownership Landscapes. *Proceedings of the Society of American Foresters National Convention*. Bethesda, Maryland. 70-74.

Sample, V. Alaric, Antony S. Cheng, Maia J. Enzer, Margaret A. Moote. 1995. Building Partnerships for Ecosystem Management on Mixed Ownership Landscapes: Regional Perspectives. The Forest Policy Center, vii.

Schuster, Ervin G. 1983. Evaluating Nonindustrial Private Forest Landowners for Forestry Assistance Programs: A Logistic Regression Approach. Research Paper INT-320 United States Department of Agriculture, Forest Service, Intermountain Forest and Range Experimentation Station.

Shands, William E. 1991. Problems and Prospects at the Urban-Forest Interface: Land uses and Expectations are in Transition. *Journal of Forestry* 89(6):23-26.

Shannon, Margaret A. 1991. Resource Managers as Policy Entrepreneurs: Governance Challenges of the Urban/Forest Interface. *Journal of Forestry* 89(6):27-30.

Syrdal, Daniel. 1984. The Legal, Political and Administrative Framework for the Urban/Forest Interface in Washington State. Pages 61-68 in *Land Use and Forest Resources in a Changing Environment: The Urban/Forest Interface* (Gordon A. Bradley, ed.). University of Washington Press. Seattle, WA.

Ticknor, W. D. 1997. A Survey of Selected Forestland Owners in South Central Indiana on Participation in Landscape-Scale Programs. *Forestry and Natural Resources* FNR-152: 1-9. Purdue University Cooperative Extension Service. West Lafayette, Indiana.

Tyson, C. Benjamin, Susan M. Campbell, and Ellen Schmidt Grady. 1998. Woodscaping for Small Landowners in Southern New England. *Journal of Forestry* 96(12): 4-9.

Vaux, Henry J. 1982. Forestry's Hotseat: The Urban Forest Interface. *American Forests* 88(5):37.

Vessels, J. T. 1997. Ownership Fragmentation and Implications for Land-Use Planning. *Proceedings of the Society of American Foresters National Convention*. Bethesda, Maryland. 295-299.

Waggener, Thomas R. 1984. Tradition versus Change in Forest Land Use. Pages 40-46 in *Land Use and Forest Resources in a Changing Environment: The Urban/Forest Interface* (Gordon A. Bradley, ed.). University of Washington Press. Seattle, WA.

Washburn, Michael P. 1996. Cross Boundary Management on Nonindustrial Private Forests in Pennsylvania: A Vision for the Future. *Proceedings of the Symposium on Nonindustrial Private Forests: Learning from the past, prospects for the future*. Washington, DC. 63-68.

Weir, George. 1992. Neighborhood Planning for Wildlife Management. *Woodlands for Wildlife* 1(2).

Williams, Ellen M. and Paul V. Ellefson. 1997. Going into Partnership to Manage a Landscape. *Journal of Forestry* 95(5):29-30, 32-33.

Yaffee, Steven L. 1998. Cooperation: A Strategy for Achieving Stewardship Across Boundaries. Pages 299-324 in *Stewardship Across Boundaries* (Richard L. Knight and Peter B. Landres, eds.). Island Press, Washington, DC.

Yarrow, Greg. 1990. Forms of Business Organizations with Emphasis on Landowner Cooperatives for Natural Resources. *Conference proceedings: Income Opportunities for the Private Landowner Through Management of Natural Resources and Recreational Access* (William N Grafton et al., eds.). West Virginia University Extension Service, Morgantown, W.Va. 264-268.

## **APPENDIX 1**

### **The Survey**



















## APPENDIX 2

### Initial Cover Letter

Forest Owner  
6315 Cedar Rd.  
Firville, WA 98271

March 5, 1999

As a graduate student in the College of Forest Resources at the University of Washington, I am conducting a study of the land-use changes that are occurring in forests near the metropolitan areas of King County. I am requesting your assistance in an attempt to better understand the values and objectives of forest landowners in this area.

You have been chosen to participate in this study because you own forestland near the metropolitan area. You were selected at random from a list of forestland owners maintained by King County. In order that the results of this study truly represent the thinking of landowners in this region, it is important that each survey be completed and returned in the enclosed stamped envelope. Your assistance in this effort is crucial to the success of the study. Please make sure that the survey is completed by the person responsible for decisions regarding your forestland.

The results of this study will be made available to the King County Rural Forest Commission, an advisory group made up of private landowners as well as representatives from the business community, environmental groups and natural resource agencies. However, your individual responses will be kept entirely confidential. The number in the upper right hand corner of the return envelope allows me to check you off the mailing list, but your name will never be attached to your responses or incorporated into the results in any way.

If you would like to receive a copy of the final report, or if you have any questions regarding the study, you may contact me at 206-296-7805 or e-mail at [bwads@u.washington.edu](mailto:bwads@u.washington.edu). I sincerely appreciate your assistance in participating in this study. The issue of urban growth and its impacts on forestlands is complex. Your input will be fully considered and will assist future efforts to address forest related issues in King County.

Sincerely,

Benj Wadsworth  
College of Forest Resources

### **APPENDIX 3**

#### **Follow-up Postcard**

Last week I sent you a survey with questions pertaining to your values and objectives as a forest landowner near the metropolitan area of King County. You were selected at random from a database maintained by the county.

If you have already returned the survey, I sincerely thank you for your participation. If you have not, please do so today. The questionnaire was sent to a relatively small, but representative, sample of forest landowners. It is extremely important that your responses be included in the study if the results are to accurately represent the opinions of forest landowners in this area.

If by some chance you did not receive the survey, or if it got misplaced, please call me today at 206-296-7805, and I will put another one in the mail right away.

Sincerely,

Benj Wadsworth  
College of Forest Resources  
University of Washington

**APPENDIX 4****Second Cover Letter**

Forest Owner  
6315 Cedar Rd.  
Firville, WA 98271

March 29, 1999

Three weeks ago, I sent you a survey with questions regarding your values and objectives as a forest landowner near the metropolitan area of King County. The survey is part of a study I am conducting as a graduate student in the College of Forest Resources at the University of Washington. I am writing to you again because I have not yet received your responses. I want to request your help once more and emphasize the importance of your participation to the success of the study. If you recently returned the survey, I am sorry for sending this follow-up mailing.

You were selected as part of a relatively small random sample of forest landowners in the county. In order for the results of this study to be truly representative of the wide range of opinions of forest landowners in this area, it is important that the responses of each recipient be included. I will begin analyzing the responses next month, so I am asking you to please return the completed survey by **Monday, April 12**. As mentioned in my previous letter, your individual responses will be kept entirely confidential. The number on the return envelope allows me to take your name off the mailing list, but neither the number nor your name will be incorporated into the results. I have enclosed another copy of the survey in case you have misplaced the first one.

If you have any questions regarding the study or wish to receive a copy of the results, please contact me at 206-296-7805 or e-mail at [bwads@u.washington.edu](mailto:bwads@u.washington.edu). Your participation in this effort is greatly appreciated.

Sincerely,

Benj Wadsworth  
College of Forest Resources  
University of Washington

P.S. There has been a fair amount of interest in the study and inquiries as to when the results will be available. I hope to have it completed sometime this summer.